Language Emergence in Collaborative CALL Environments: An Investigation within Higher Education in Oman from a Complexity Theory and Noticing Hypothesis Perspective

Al Saidi, Faisal

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Language Emergence in Collaborative CALL Environments: An Investigation within Higher Education in Oman from a Complexity Theory and Noticing Hypothesis Perspective

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Declaration of any previous submission of the work

The material presented here for examination for the award of a higher degree by research has not been incorporated into a submission for another degree.

Candidate's signature 

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Abstract

This study investigates the process of the emergence of authentic language use in collaborative activities within computer-assisted language learning (CALL) environments. Despite technology being widely incorporated in English language programmes in higher education institutions in Oman, language study in a CALL context is under-researched in the Omani context. The educational reforms and strategic plans in Oman have always targeted wider incorporation of technology as well as developing English language teaching and learning despite the lack of studies that investigate and explore the ways in which the two might relate in the Omani context. From the joint, and novel, perspectives of Complexity Theory and the Noticing Hypothesis, this study investigates the emergence of authentic language use in collaborative CALL environments and the ways in which this process of emergence relates to collaboration. To achieve this, the study adopts the perspective of Complexity Theory where language development is argued to be emergent, nonlinear, based on the here-and-now context and in constant flux. The study also draws on the Noticing Hypothesis in relation to how and why learners attend to specific features of language in a CALL environment.

The study followed a qualitative enquiry design. Data were drawn from twelve groups of three to four learners within three English language classes from a foundation programme in one Omani college. In the course of one semester, two language learning lessons from each class were observed. After each observed lesson, two groups of learners were selected to participate in stimulated recall interviews. The findings indicated that the language emergence process in collaborative CALL environments is triggered by a process of signalling relevance (perceiving a link between Web-based cues and the learners' goal in a class activity) followed by an action (e.g., a discussion or rereading of the text) and finally the act of evaluating that information as to whether or not it is relevant to the learners' goals in the activity. The process was also found to be influenced by the participants' interaction with the multimodal components in the collaborative CALL environment. The findings also indicated that, while carrying out their

activities, the participants employed a number of specific strategies that influenced the way in which they attended to particular language, selected information and achieved their goals. The study concludes by identifying a range of recommendations derived from the findings for facilitating the occurrence of authentic language use in a collaborative CALL environment.

List of abbreviations

CALL	Computer-assisted Language Learning.
CT	Complexity Theory.
NH	Noticing Hypothesis.
CMC	Computer-mediated Communication.
SCMC	Synchronous Computer-mediated Communication.
ACMC	Asynchronous Computer-mediated Communication.
VSRI	Video Stimulated Recall Interview.
OAAA	Oman Academic Accreditation Authority.
BEC	Basic Education Curriculum.
PBEC	Post Basic Education Curriculum.
TeLL	Technology-enhanced Language Learning.
ICT	Information Communication Technology.
NBLT	Network-based Language Teaching.

Chapter One: Introduction

This chapter begins by presenting an overview of the wider and institutional contexts of the study to help situate the issue under investigation. The chapter then presents the motivation for the study, and discusses its topic and aims. It also provides information about computer-assisted language learning (CALL) in the context where the study was conducted and explains why such a study was useful for that context. This chapter ends by defining key terms and pointing out the key issues that the study sought to address and explains how the thesis has been organised.

1.1. Context

This section presents an overview of the development of the educational system in Oman. Although this overview is not directly linked to the investigation of how language emergence relates to collaborative CALL environments, it is relevant to this study and useful in two main ways. First, this description of the educational system in Oman helps to situate the issue under investigation in this study within its wider context. Second, this section provides an understanding of the background education that the participants of this study as well as I, as the researcher, have had. This section explains how the development of the English language of the Omani students has been a matter of concern and a key driver for educational reform in Oman at both the school and higher education levels. The literature indicates that reform in the Omani educational system has passed through two key stages (e.g., Al-Ani, 2017; Al Bandary, 2005; Al Manthri, 2001; Al Nabhani, 2007; Al Najar, 2016; Issan & Donn, 2007). This section delineates the two stages, and then goes on to present an overview of the development of higher education in Oman with a focus on the development of the Colleges of Applied Sciences, as one of these was the location where this study was conducted.

1.1.1. Key stages of educational reform in Oman

The first stage of Oman's educational reforms extended from 1970 to 1995, which marked the focus of the Omani government on expanding the educational system and widening access to education through an initiative known as 'education for all'. Prior to 1970, there were only three schools across the country that provided elementary education, and this was for boys only. After 1970, the year in which Sultan Qaboos ascended the throne, the number of schools increased from three (with about 900 pupils) to 1,040 schools with 517,053 pupils in the academic year 2011-2012 (Al Najar, 2016, citing the Department of Statistics and Indicators, 2012). Currently, there are 1,124 schools with 579,024 pupils (Ministry of Education Website, 2016). The educational system that was devised in 1970 consisted of an elementary stage of six years (grades one to six for the ages 6 to 11 years), a primary stage (grades seven to nine for the ages 12 to 14), and a secondary stage, consisting of three years, from the tenth grade to the twelfth grade (for the ages 15 to 17 years). The number of pupils per classroom ranged between 35 to 50, and the schools were equipped with libraries that included some printed materials (Al-Issa & Al-Bulushi, 2012). Textbooks and other relevant educational printed materials were mainly imported from other countries such as Qatar and Egypt, and assessment was dominated by the use of formal tests (Al-Issa & Al-Bulushi, 2012). It was stated that the aim of that educational system was to promote the acquisition of literacy, numeracy, language, information technology, communication and team building skills in a standards-driven, outcomes-based curricular programme (Issan & Donn, 2007).

The second key stage of educational reform commenced in the mid-1990s. As Oman entered the twenty-first century, government strategic plans, including educational plans, have undergone major revisions and processes of evaluation resulting (in 1995) in the 2020 vision plan. In light of the 2020 vision plan, a new educational system was proposed aiming at providing students with the skills and knowledge to help the country achieve economic self-sufficiency through a diversified economy and to keep pace with

technological change (Al Manthri, 2001). In response to this plan, the Ministry of Education implemented a number of initiatives for the development of the educational system which were incorporated within the new project of Basic Education Curriculum (BEC) and Post Basic Education Curriculum (PBEC), which are explained in more detail below.

BEC and PBEC were gradually implemented from 1998 onwards, and reached full implementation by the academic year 2011-2012 (Al-Ani, 2017). BEC consists of two cycles; a four-year cycle of first grade to the fourth grade (ages 6 to 9 years), followed by the second cycle that extends for 6 years, from the fifth grade to the tenth grade (ages 10 to 15 years). That is, during these two stages, pupils study for ten years after which they move to the PBEC (Ministry of Education, 2007; cited in Al Najar, 2016). In addition to the implementation of the BEC and the PBEC, the reform also involved restructuring the school day and school year, promoting the option of private education, enhancing the qualification of teachers, strengthening the programs in science, mathematics, and English language, introducing a 'life skills program', developing cost-effective laboratory facilities for pupils of all ages; transforming school libraries into learning resource centres, and developing the assessment techniques (Al Manthri, 2001). It was proposed by the Ministry of Education that the new reform would promote the acquisition of knowledge and skills that rely on students employing problem solving and higher order thinking skills, and technological applications. This new system also involved programmes of training for teachers and administrators.

Al Manthri (2001) outlines the new policies that were introduced as part of this reform. The policies that are of more relevance to the current study (as they relate to technology incorporation and English language development curriculum and teaching) included:

a) Increasing emphasis on computer skills as well as on mathematics, science and economics by increasing the number of periods allocated for these subjects

b) Teaching English at and from the first stage of basic education
c) Cancelling evening classes; instead increasing the length of day class periods
d) Modernising the curriculum to keep pace with scientific and technological progress
e) Upgrading educational practices to match modern educational techniques
f) Improving the employment conditions of teachers in order to attract high calibre personnel
g) Improving the in-service training of teachers.

The above policies are particularly relevant because they reveal the educational direction in which Oman has been moving, and the importance that has been placed on incorporating technology in the classroom, allocating more time for the teaching of English language, developing the curriculum and providing teacher development programmes.

By implementing BEC and PBEC, it was the Ministry of Education's aim to address the weaknesses of the previous educational system. The weaknesses have been identified in several independent studies (e.g., Al Najar, 2016 and Al-Issa & Al-Bulushi, 2012) and reports by international organisations (UNESCO and World Bank). Those weaknesses were in areas that included English language skills, general personal and communication skills, study skills, and students' ability to meet the requirements of higher education admission. Nevertheless, a number of studies have noted that a significant number of PBEC graduates still face difficulties meeting the requirements of higher education admission (Al-Ani, 2017; Al-Issa & Al-Bulushi, 2012). Other studies have also found that the dropout rate before attaining a General Diploma (The degree that PBEC graduates attain) is significantly high (Al Najar, 2016). In a study of job seekers in 2014, it was found that 40% had not completed the PBEC (65% of whom were aged under 25 and 28% between 25 and 39) (Ministry of Economics and Trade, 2012; cited in Al-Ani, 2017). These figures represent a challenge to the

efficacy of the new educational system in Oman considering that it was designed to prepare students for enrolment in higher education, to be better equipped to meet labour market expectations and to be prepared to effectively engage in a world of rapidly developing technology (Ministry of Higher Education, 2009; cited in Al-Ani, 2017).

1.1.2. Overview of higher education development in Oman

It has been reported that the first higher education institutions in Oman were established in the period from 1981 to 1985 (Al Manthri, 2001; Alufi, 2014). These comprised six colleges that offered two-year programmes for some of the first groups of high school graduates to prepare them to teach in the schools. Those institutions were staffed mostly by expatriate Arabs, and they provided training in curriculum structure and content and development in teaching methods through in-service development programmes for teachers (Al Bandary, 2005). In 1995, those colleges were converted to full four-year Colleges of Education granting a four-year Bachelor of Education degree, instead of the two-year post-secondary teaching diploma. This four-year Bachelor of Education degree became the revised standard minimum qualification for all new teachers throughout the country (Al Manthri, 2001). Before these colleges of education were established, the College of Education within Sultan Qaboos University (established in 1986) was the only institution in Oman that offered university-level teacher qualifications.

In the period 1970 to 1980, there were other government-run institutions that offered vocational (up to certificate level) and technical (up to undergraduate diploma level) programs. Following the establishment of Sultan Qaboos University, many public higher education institutions were established under different ministries, such as Colleges of Education as mentioned above (under the Ministry of Higher Education), Colleges of technology (under the Ministry of Manpower), and Nursing Institutes (under the Ministry of Health). Moreover, other private higher education institutions were established during the 1990s and 2000s. To meet the growing number of Omani students, the

Omani Government has also been providing them with internal and external scholarships. However, with over 55,000 school graduates every year exiting school, the private as well as the state institutions in Oman face serious challenges to meet the ever increasing demand for places in higher education.

The years 2006 to 2009 witnessed the conversion of five of the six Colleges of Education into Colleges of Applied Sciences that award bachelor degrees in international business, administration, information technology, design, communications, engineering, English language and applied biotechnology (Education Council Oman website, 2016). The Ministry of Higher Education at the time explained that the change was a response to competing priorities brought about through both globalisation and Omanisation, a government scheme for gradually replacing some of the labour force with Omanis (Issan & Donn, 2007). The Ministry of Higher Education in cooperation with the Ministry of Education at that time also announced that there was a need to redirect resources to developing and training in-service teachers in Oman instead of qualifying more new teachers, as they reported that the number of teachers was 24 for every 1000 student which was better than the average for developed countries, which was 29 teachers for each 1000 students (Ministry of Education 2005, cited in Issan & Donn, 2007).

The account of the educational reform in Oman presented above shows that the reforms that have been implemented in Oman (School and higher education) were driven primarily by the economic plans for the country. Within these reforms, the implementation of technology and the development of English language have consistently been emphasised. Hence, a new English language curriculum has been introduced, classrooms in both schools and higher education institutions were equipped with technology, and teacher professional development programmes have been incorporated. In spite of this emphasis, within the Omani context and prior to the current study there were no studies that investigated the use of technology in the

English language classroom with regard to the emergence of authentic language use.

1.2. Research problem and motivation

I was motivated to investigate the process of the emergence of authentic language use in collaborative activities within CALL environments for two reasons. The first stemmed from the understanding I developed from my review of the educational reforms in Oman which, as described above, frequently emphasised wider incorporation of technology and development of students' English language, despite the lack of studies that investigate how the two – the use of technology and language development - might relate, particularly in the Omani context. In other words, there appeared to be no explicit, evidence-based, context-sensitive link made between these two key issues. This understanding convinced me that there was a lack of empirical evidence that could provide practitioners (like myself) and policy makers in Oman with some guidance on how, if at all, language emergence at the micro level of language development may take place in a collaborative learning activity within a learning environment in which technology is part. The choice of this specific area to investigate was guided by the second issue that motivated me to conduct this research study. Related to the first issue, CALL studies in Oman have focused extensively on issues related to the implementation of technology in the language classroom in terms of challenges, attitudes and perceptions rather than on the actual processes of language development in a learning environment where technology is used. Addressing this gap was my second reason to pursue this research project. This is the scope within which this research operated, i.e., an investigation of bottom-up language emergence process in technology-based learning environments. The following paragraphs discuss these two issues in more detail.

As noted in Section 1.1, the school and higher education reforms that have been implemented in Oman are described as being driven primarily by the

economic needs and goals of the country. This is indicated on the official webpage of Education Council of Oman (2016) and has been noted by a number of independent researchers (e.g., Al-Issa & Al-Bulushi, 2012; Al Manthri, 2001; Rassekh, 2004). This trend appears to be the case not only in Oman but also elsewhere. Other studies have suggested that the growing adoption of technology in education has been driven by national and international policies aimed at developing learners' twenty-first century skills (Solomon & Schrum, 2007; Thomas, 2017).

Numerous studies have also been conducted across a range of contexts which have critically examined the role and value of technology in learning environments (Conole, 2008; Levak & Son, 2016; Li & Zhu, 2017; Tanaka, 2005, Zeng & Takatsuka, 2009), including CALL. In short, the political and economic dimensions of the Omani educational reforms, as well as the role of technology in the classroom, have already been extensively investigated. However, in the Omani language learning context, there is little research that investigates the association between a technology rich environment and language use, and none prior to the current study which investigates the micro level process of language emergence. Therefore, political and economic policy issues, as well as concerns about the value of technology in educational environments in Oman, while useful in terms of background information, fall outside the scope of the current study. What comes within it is the process of language emergence in collaborative activities which are carried out within CALL environments, with a particular focus on authentic real-time language use and interaction.

Second, my motivation to research the ways in which authentic language use emerges and how it relates to collaboration within a CALL environment was to address a gap that I identified within extant CALL research in Oman. Previous studies have investigated the implementation of technology in the educational programmes of the Omani higher education institutions and have identified serious challenges, such as lack of teacher training, resources and time to meet the requirements and expectations that come with the embrace

of educational technology (Al-Issa & Al-bulushi, 2012; Al Musawi, 2002; 2007; Al-senaidi, Lin & Poirot, 2009; Chirciu & Mishra, 2014; Terry, 2016).

These identified challenges have become the focus of extensive CALL research in Oman, and they continued to be emphasised. Other issues that have been investigated are the effects of computer-mediated instruction on academic course performance (Alkharusi, Kazem & Al-Musawai, 2009), teachers' and learners' attitudes towards and perceptions about the use of technology in language learning (Ambu-Said, 2010), the relationship between autonomy (self-access and self-directedness) and the use of e-learning (Chirciu & Mishra, 2014), and the effect of technology-mediated flipped instruction (Gasmi & Thomas, 2017). Although these studies indicate a positive relationship between the use of technology and aspects of language learning like autonomy and learning strategies (as in Chirciu & Mishra, 2014), motivation (Ambu-Said, 2010), provision of social support and scaffolding for learners (Alkharusi et al, 2009), and cognitive and behavioural engagement (Gasmi & Thomas, 2017), they all underscore similar challenges to those identified and focused on in earlier studies within the context of Omani higher education; i.e., lack of training, time and space, to be major factors hindering a more effective use of technology in the classroom. Also, being based on data from interviews, post-tests and surveys, they do not address the actual processes and activities that take place in those technology-based classes and courses. The conclusions from these studies have made a valuable contribution in the areas that they have investigated, and have helped provide a broad understanding of many of the issues in technology rich language learning environments, but they have not helped provide insights into the actual processes of language use in language learning environments in which technology is part.

As a member of the teaching faculty in one of the state higher education institutions in Oman since 2009, I have seen the challenges described above increasingly being recognised and addressed by the Omani government. According to Oman Academic Accreditation Authority (OAAA), a

governmental body that is responsible for regulating the quality of higher education in Oman to ensure the maintenance of a level that meets international standards and to encourage higher education institutions to improve their internal quality (as described on the webpage of the Education Council of Oman, 2016), higher education institutions should describe and evaluate the information and learning technology services in place to support teaching and learning (OAAA, 2016). This may include, according to the OAAA, consideration of online learning management platforms, Wi-Fi provision, computer-assisted learning and provision of IT resources, helpdesk and training services. This directive has been responded to by a rapid adoption of technology by the higher education institutions in Oman and by incorporating wider use of technology-based instruction in the curriculum of the courses within these institutions. The use of the computer lab has been incorporated within the curriculum and teachers have received training on the use of some learning platforms such as Blackboard and Moodle.

The current study adopts an ecological approach to investigate how the process of language emergence occurs in a collaborative activity within a CALL environment aiming to find out ‘‘what is really happening when [English] is learned with the help of technology’’ (Stickler & Shi, 2016, p. 120). By addressing this area of CALL research in Oman, my study makes an original contribution to the body of research conducted in an Omani context, but also adds to our knowledge about how the emergence of authentic language use takes place in collaborative language learning activities within CALL environments. Given this focus, it was not within the scope of this study to evaluate or question the use of technology in the language classroom but to investigate the actual process of language use in collaborative learning environments where technology is used.

1.3. Research topic and framework

As explained above, the topic this doctoral thesis investigates is the micro level process of language emergence in a collaborative CALL environment. Within the thesis, it is accepted that technology supports learners in a myriad ways (Reinders & Hubbard, 2013) and that the potential benefits of the use of technology in the classroom are rarely questioned (Beatty, 2010; Chun, 2011; Felix, 2005; Warschauer, 1996), but "the jury is still out" (Chun, 2011, p. 676) on how best it can be used in the classroom. Although the use of technology in the language classroom has brought about an incremental change to the ways in which language is taught and learnt (Thomas & Reinders, 2010), its actual role is still part of ongoing investigation (Bax, 2011; Golonka, Bowles, Frank, Richardson & Freynik, 2014). While previous research on CALL has revealed links between the use of technology and the development of language (e.g., Karlström & Lundin, 2013; Kennedy & Levy, 2009; Nadolny, 2017; Park & Kim, 2016), the nature of this relationship and why or how it happens had not yet been addressed. This study addresses that relationship by investigating the ways in which the learners' authentic language use emerges, and how language use emergence relates to the ways in which the learners interact and collaborate within CALL environments.

The position taken in this research study regarding the role of technology in language learning is that the role of technology in language learning is far more complicated than the idea that technology can single-handedly provide learners with all the tools they need to learn a language. Reinders and Hubbard (2013) argue that without an adequate learning environment (e.g., of support, feedback, guidance, structure, and practice), an effective use of what technology affords is not possible. Acknowledging this position, I then recognised a need to understand the micro processes involved in language production in a CALL environment. This gave rise to the specific intent for this study of investigating the process of language use emergence in collaborative activities within a CALL environment.

This investigation was guided by Complexity Theory (CT), which has proven useful in investigating how the multiple components of an environment (agents, learners and teachers, as well as the properties of the physical and temporal environment of CALL) interact with each other and how that interactive behaviour relates to the ways in which the learners' language develops (Cameron, 2015; Hiver & Al-Hoorie, 2016; Larsen-Freeman, 2011). From the perspective of CT, the development of a learner's language can be studied as emerging from use (Ellis & Larsen-Freeman 2006) and can be explained on the basis of "the spontaneous emergence of more complex forms of behavior due to the cooperation of the multiple heterogeneous parts of the system that produce coherent complex patterned behavior" (Evans, 2007, p. 132). Within CT, it is also argued that the end-state of a learners' language results from dynamic cycles of language use, language perception, and language learning in the authentic interaction between language users (Ellis, 2008a).

Within CT, it is also argued that every language use is viewed as being influenced by language internal and external resources and the ways in which these resources are used (Larsen-Freeman & Cameron, 2008). As has been argued within the interactionist approach, these resources are brought together most usefully, although not exclusively, during *negotiation for meaning*'' (Long, 1996, p. 414; emphasis in original). In line with these arguments, language emergence has been described, within CT, as occurring at two levels: (1) at a microscopic level of language use and behavior which is the level of individual language users, and (2) at the macroscopic level of language order, a stabilised level of language use across language users and contexts (Larsen-Freeman & Cameron, 2008). Since the macro level of language emergence is concerned with the development of the global order of language which occurs at a diachronic level (Ellis, 2008a), this study focused on the micro level, synchronic level of language emergence, the level of the individual language users, in the collaborative CALL environment. That is, this study sought to investigate the synchronic bottom-up emergence of language in collaborative CALL environments.

The significance of studying the micro level of language emergence is that "[e]ach emergent level cannot come into being except by involving the levels [processes] that lie below it" (Ellis & Larsen-Freeman, 2006, p. 576). These arguments formed the basis for the understanding in this study that the process involved in language use, language development, and language emergence is shared. The same process is common to all three concepts, but they operate at different timescales (Larsen-Freeman & Cameron, 2008). The bottom-up emergence of language is understood in this study as the learners' effort to communicate and negotiate for meaning, which is a process that is believed to connect input, internal capacities, selective attention and output in a way that facilitates language development (Long, 1996). In other words, language emergence in this study refers to the spontaneous, authentic language use through which learners make an effort to construct meaning and achieve communicative goals.

The emergent language use instances that this study investigated were part of real-time interaction. Within CT, it has been argued that due to the pressure of real-time communication, language users adapt and co-adapt to a given context of language use, resulting in the emergence of form-meaning-use constructions, a process referred to as soft-assembly (Larsen-Freeman, 2011; 2016b), discussed further in Chapter Three. To investigate the emergence of language use and how collaboration and the other components of the collaborative CALL environment interact in ways that relate to and influence the process of language emergence, it was decided in this study to account for the embodied actions that the learners take while carrying out the collaborative CALL activities. For this purpose, this study also draws on the Noticing Hypothesis (NH) and the concept of affordances. NH has been presented as a useful theoretical perspective to investigate how learners attend to language cues in language activities and what the role of noticing in language learning is (Schmidt, 2001). The concept of affordances forms a mediating part of the theoretical framework in this study because it has proven useful to study how learners perceive language cues as offering the basis for action (van Lier, 2000; 2004).

CT and NH align with the turn in recent CALL research towards adopting ecological approach. Recent CALL literature features “a trend towards more ecological approaches to CALL research, rather than the experimental studies dominating its early years” (Stickler & Shi, 2016, p. 120). The scholarly literature reveals that the emphasis in recent CALL studies has been on how the components of the technology-based learning environment relate to each other ecologically for the purpose of meaning construction. Within the ecological approach, language development is studied within the ecology of the language use (Warschauer, 1999, n.p.) and through investigating how the components in a CALL environment interact within authentic pedagogical contexts (Chambers & Bax, 2006). This recent emphasis and turn in CALL studies, as understood in this research, have guided the decision to frame this investigation within the ecological approach.

1.4. Significance of the study

The novel combination of CT and NH in the conceptual framework has helped to reveal key issues including novel language use, autonomy, attention, salience, learning individualisation and context and the ways in which these issues relate to the emergence of authentic language. The evidence provided through the analysis of the data in the study not only accords with principles of CT and NH but also explains the process of language emergence through such perspectives. In addition, the study’s findings contribute to knowledge concerning the use of technology as an integral component in a collaborative CALL environment and the ways in which it relates to the emergence of authentic language use.

Another factor that makes the study unique is the context in which it was carried out. As discussed above (Section 1.2), this is the first time the process of language emergence within collaborative CALL environments in the Omani context has been investigated. The study has revealed a number of characteristics linked to the emergence of authentic language use in the

collaborative CALL environment. These characteristics include the use of the Web as a versatile, freely available source of information, richness in opportunities for iterative language use and flexibility to choose information based on the learners' own interests, preferences, understanding and goals. The results and recommendations presented in this thesis have the potential to contribute to developing the field of CALL research in Oman as well as English language pedagogy and educational policy, especially those concerned with the plans of wider incorporation of technology in English language programmes in the Omani higher education institutions.

1.5. Definition of terms

This section briefly defines key terms and describes how they were used in the study. This section includes general terms that are not associated with a specific theoretical framework. Underpinning concepts such as ecological perspective, complexity and noticing are conceptual terms introduced above and discussed in more detail in Chapter Three.

Language development is a term used in this study to refer to the process of language learning, but the term 'development' is preferred in the study (over 'learning' and 'acquisition') as it indicates that the process is in 'constant change' and is never static. Through perceiving language development as being in constant change, the study emphasises language processing rather than correctness of use, which is what the study aimed to investigate, i.e., the process of authentic language use emergence. The use of the word 'process' in this description is informed by the idea within CT that language development occurs across two levels**;** a micro level of novel **language use emergence** that strengthens or weakens the emergence of a more stable macro level of language structure (Ellis, 2008a; Larsen-Freeman & Cameron, 2008).

Language emergence is a process in itself that occurs within the process of language development. Within CT, it is maintained that the process of

language emergence relates to the process of language development in that language emergence shares common processes with language development but that the two operate at different timescales. In this thesis, language emergence is perceived as a process that occurs at two levels: a diachronic level which is concerned with the emergence of more stable language patterns over longer periods of time and the synchronic level of language emergence which refers to the **authentic use of language** by the individual (learner) in real time. The investigation reported in this thesis focuses in particular on the latter.

Authentic language use is viewed and used in this study as instances of language use within the process of micro level language emergence. The term is used to refer to the spontaneous language use by which learners make an effort to construct meaning or achieve a communicative goal of their own within the **collaborative CALL environment**.

CALL environment is the here-and-now context within which learners in groups carry out collaborative language learning activities in which the use of technology is part. In the study, the CALL environments in which such language learning activities were carried out were language classes from an English language programme for first year college students and the technology that was used was computer-based (e.g., the Web, Blogs, and Google Docs). Within the study, these environments are referred to as collaborative CALL environments because they were the context where the **collaborative CALL activities** were conducted. **Context** in this study is not perceived as a stable background but as coupled with the individual within it (Larsen-Freeman & Cameron, 2008). Thus, the CALL environments in the study were viewed as comprising components of a physical nature (e.g., the computer, print materials and the white board) and others that are abstract (such as feedback, instruction and perception). Operating through CT, the ways in which the learners related to these components were accounted for in investigating how authentic language use emerges within the CALL environment.

Collaborative CALL activities are the language-related activities that were carried out by the learners in groups within the CALL environment; hence, these groups are referred to in the study as **collaborative CALL groups**. The groups consisted of three to four learners, and there were five to six groups in each CALL environment. Within these groups, the learners carried out collaborative computer-based language-related activities which had been allocated to them by their teacher. The activities differed from one CALL environment to another.

The Web is what the learners use in the collaborative CALL environment to access information on computers which are connected to **the Internet**. Thus, the Web in the study is understood as being a portion of the Internet but the two are not perceived as synonymous. In this study, the learners utilised Internet Explorer to access webpages such as Guinness World Records, Booking.com, Blogspot, Google Docs, Google Maps and other webpages through the use of Google search engine.

Affordances are language use opportunities enacted by learners in order to achieve their goal in the collaborative CALL activity. Because the aim of the study is to investigate the emergence of authentic language use, affordances were those opportunities in which learners spontaneously respond to a cue from the collaborative CALL environment. The cues could be visual, textual or auditory and the learners' responses could be language-based or non-language based (e.g., pointing or changes on facial expressions).

1.6. Research questions

As stated above, the coupling of technology and English language development as key concerns for Omani education led to identification of the research issue; that is, how does authentic language emerge in a CALL environment in Omani higher education? As discussed briefly above, and in

more detail in Chapter Three, according to CT and NH, one way to study language emergence is through investigating the process of authentic language use as it takes place in real time. The identified research issue in this study was addressed by investigating the occurrence of instances of authentic language use in collaborative CALL environment, salience, and the contextual factors that influence language emergence in the collaborative CALL environment. These key areas were addressed through the following three research questions:

- How do instances of authentic language use emerge in a collaborative CALL environment?
- How do the features of the affordances within the collaborative CALL environment affect the salience of certain language forms?
- What are the specific contextual factors that might impact language emergence in the collaborative CALL environment?

1.7. Thesis organisation

This thesis has been organised into six chapters with the current introductory chapter as the first. The second chapter reviews the scholarly literature; it begins by introducing the term collaborative CALL environments and explains how it relates to the field of CALL and what this thesis may contribute to the field as it focuses on real-time language interaction studying it from an ecological approach. In Chapter Three, CT, NH and affordances are presented as the components of the theoretical framework that informs this study concerning language emergence. Chapter Four explains the research paradigm and presents the research design of this study. It also provides an explanation of the methods that were used in data collection. Chapter Five, the Findings chapter, is divided into three sections. Section One provides information about the six CALL lessons that were observed from the three collaborative CALL classes; Chapter Five then goes on to present and analyse key findings and organise them into relevant areas. Chapter Six begins with a further discussion of the key findings for the purpose of addressing the research questions. The contribution made by the study and the implications for policy and pedagogical practice are described

in Sections Three and Four of Chapter Six. As the last chapter, Chapter Six also presents some of the limitations to this study and, in light of which, suggests areas for future research. The last section in Chapter Six provides a research summary and concluding comments.

Chapter Two: Literature Review

2.1. Introduction

This chapter explores the research literature on collaborative CALL environments within the context of the current study. In particular, the chapter evaluates the extent to which CALL research has been linked to the emergence of language use. It begins by taking a chronological approach to describing the nature of CALL and the ways that it has been investigated. Then the following sections explore the relevant literature on the ecological approach in studying technology-based language learning environments and the literature on the components of the collaborative CALL environment in relation to language emergence.

2.2. Collaborative CALL environment

In recent CALL research, CALL has been described as a language learning environment that includes almost any use of technology in the language classroom (e.g., Arno'-Macia, 2012; Beatty, 2010; Calvo-Ferrer, Melchor-Couto & Jauregi, 2016; Egbert, 2005; Garret, 2009; Levy & Hubbard, 2005; Warschauer, 2002). Within this view of CALL, the use of technology is described as a natural part of the language learning process (Warschauer, 1999), in other words, 'normalised' (Bax, 2003). The 'ecological approach' to CALL, which is discussed later in this chapter, aligns with this view and has been adopted within much recent CALL research where CALL researchers aim to investigate the actual processes of language development when languages are learned with the help of technology (Stickler & Shi, 2016, p. 120).

These recent descriptions represent the latest among many ways in which CALL can be defined. There have been many changes in how CALL has been viewed over the years, as illustrated by the following quotations, presented in chronological order:

> The search for and study of *applications of the computer* in language teaching and learning. (Levy, 1997, p. 1; emphasis added)
>
> CALL means learners *learning* language in any context with, through, and around computer technologies. (Egbert, 2005, p. 4; emphasis added)
>
> CALL nowadays refers to any *environment* in which a learner, alone or collaboratively with peers, uses technology in a second or other language. (Heift & Chapelle, 2011, p. 556; emphasis added).

By emphasising the computer applications in studies of CALL, the first definition reflects principles of traditional approaches where studies of CALL, according to Carrier (1985, p. 131) were ‘‘owing much to programed learning and drill-and-practice teaching approaches’’. The second definition, published eight years later, shifts the focus to the learner by emphasising language learning, which reflects key approaches during that period of communicative language teaching or task-based learning and teaching. In a historical account of CALL development in the period of the 1990s when personal computers and the World Wide Web were incorporated into the language classroom, CALL was labelled as ‘communicative CALL’ (Warschauer & Healey, 1998). In communicative CALL the focus shifted more to ‘‘using forms than on the forms themselves, teach[ing] grammar implicitly rather than explicitly, allow[ing] and encourag[ing] students to generate original utterances rather than just manipulate prefabricated language … stressing that learning was a process of discovery’’ (ibid., p. 57).

In the third definition, written in the current decade, CALL is now described as a language learning environment that involves the use of technology by an individual or a group of learners. The word ‘computer’ has disappeared, which reinforces the shift away from the device to the way in which the device is used. The way in which a collaborative CALL environment has been interpreted for the current study accords with this shift. This view has been

adopted for this study as it sought to ‘‘investigate the broader ecological context that affects language learning and use [taking] into account broad sociocultural factors’’ (Warschauer, 1998, p. 758) which, it has been argued, help to acquire a holistic understanding of learner behaviour (Thomas, 2017).

Despite the introduction of various terms in the field of language learning, such as Computer Mediated Communication (CMC), Information Communication Technologies (ICTs), Network-based Language Teaching (NBLT) and Technology Enhanced Language Learning (TeLL), CALL has maintained its position in mainstream research as a collective name that incorporates various technologies used in the field of language learning. This study has maintained the use of CALL as the collective term because unlike CMC and ICTs, CALL emphasises language learning rather than communication more broadly. Thus, CALL reflects the uniqueness and complexity of language and the language learning context (Levy & Hubbard, 2005). Although NBLT emphasises language teaching, when introduced, it was described as ‘‘a new and different side of CALL, where human to human communication [was] the focus’’ (Warschauer & Kern, 2000, p. 1). This description was criticised by those who believed that NBLT was not a new side of CALL. It was argued that NBLT presented complexities of the learning and teaching experience from a perspective that was an ‘expansion’ of CALL rather than a ‘reconceptualisation’ of it (Chappell, 2000, p. 222). Also, because the Web-based Networks of NLBT were an advancement of technology, it was argued that it would be ‘‘distracting and even confusing to invent new terms with every technological advance’’ (Levy & Hubbard, 2005, p. 148). In addition, with its focus on ‘teaching’, it was not considered appropriate for this study, which was focused on students and their experience. However, like NBLT, the current study helps move the field of CALL forward by presenting and addressing complexities of computer-based language learning environments in order to understand the process of language emergence.

The call for a shift to using TeLL rather than CALL was based on the position that it is 'technology' and not the computer that is involved, and that it 'enhances' rather than assists. However, ''regardless of the immediate strategic value a different label might have for a given cause … they serve to fragment rather than unite a field that presumably has a lot more to gain by being unified,'' as Levy and Hubbard (2005, p. 148) argue. Additionally, although TeLL emphasises technology and language learning, it has been described and defined in a similar way to CALL. That is, like current CALL research, TeLL research investigates issues related to language learning in technology-based environments regardless of the device used (e.g., Chau & Lee, 2014; Liakin, Cordoso & Liakina, 2014; Yang & Chen, 2007). Given this similarity of meaning, it was felt that identifying the current study as related to CALL rather than TeLL would be more appropriate as CALL is a well-established field that still exists in the names of a number of organisations and publications. Furthermore, it contributes to making CALL a ''collective name which spans the development and use of computer technology in relation to language teaching and learning'' (Levy & Hubbard, 2005, p. 146).

The progress in the field of CALL and the change in what is emphasised have contributed to developing the understanding in this study that language development within a CALL environment is currently perceived as a complex process and that language use within such learning environments is key in this investigation. This links to the choice of CT for this study, where the emergence of authentic language use is perceived as a micro level of language development (Larsen-Freeman, 2013a) and that language learning activities that are rich in opportunities for novel language use have the potential to facilitate language development (Larsen-Freeman, 2014b). Moreover, language development within the ecological approach is linked to language use during interaction between learners in a learning environment (Chambers & Bax, 2006). This understanding of how recent CALL relates to CT led to the choice of the ecological approach as a suitable perspective from which to view CALL, and to shaping the focus of this study becoming the process of language emergence and its link to collaboration as well as to the other components within the CALL environment.

The following section explores how the ecological approach has been interpreted in the CALL literature and how it relates to investigating the emergence of authentic language use in collaborative environments. Then the sections that follow explore key components within the collaborative CALL environments that have been linked in the CALL literature to language emergence.

2.2.1. Ecological approach in CALL

As stated above, recent CALL research tends to adopt an ecological approach, within which CALL studies have shifted focus from the computer as a mechanical tutor to the language learning process (Stickler & Shi, 2016; Warschauer & Healey, 1998). The ecological approach in CALL studies is one within which the learner is provided with opportunities to work at an individual pace and technology is perceived as being incorporated more fully into the language learning process (Warschauer & Healey, 1998). These two principles of the ecological approach - concerning the role of the learner and technology in the CALL environment - have been linked in the CALL literature to the emergence of language use, as explained in the following paragraphs.

Within the ecological approach, a CALL environment is viewed as one that facilitates the provision of a range of opportunities for learners to construct meaning in relation to their own interests and experiences through being actively involved in interaction and communication (e.g., Collentine, 2011; Derry, 2008; Peng, 2011; van Lier, 2004). Such opportunities for meaning construction and language use are argued to become available as soon as the learner recognises them (Thoms, 2014; van Lier, 2004). That is, the provision of the meaning making and language use opportunities in CALL environments depends on how the learners relate to stimuli within the CALL environment. When technology was described as a component of the CALL environment that ‘‘always makes a difference”, it was in relation to the “language produced, the learning and teaching strategies, the learner attitudes and the learning process’’ (Levy, 2000, p. 190) – a description that

emphasises what the learners do in a CALL environment rather than the features of the technology used. These arguments indicate that investigating the emergence of language use through the ecological approach could be achieved through examining the ways in which the learners attend to stimuli from the collaborative CALL environment – a point that links the ecological approach with NH, more details about which can be found in Chapter Three.

Incorporating technology more fully in the language learning process has been referred to as a process of normalisation which has been explained in relation to how the components interact and operate within real pedagogical contexts (Chambers & Bax, 2006, p. 466-467). In CALL studies that investigate interaction and language use, the process of normalisation has been interpreted as putting the technology of the CALL environment ‘‘in the ecology of the language *use* … as a natural and powerful part of the language learning *process* … so integrated as to be invisible” (Warschauer, 1999, n.p.; emphasis added). A number of CALL studies have discussed what it means to view technology as being integrated fully in the language learning process. For example, in a study that examined naturally occurring spelling correction practices between learners writing collaboratively on a computer, the use of the computer was described as being part of the ecology of that learning environment (Musk, 2015). The findings from that study, which used data from video-recordings of four pairs of learners writing a text about famous Americans, informed the understanding in this study of what it could mean for the computer to be part of the ecology of the CALL environment. It was found that most of the spelling corrections were self-initiated, with the learner adopting a trial-and-error approach, by typing with very little intervention from the other learner or the automatic help features of the computer software. The study reports that even when the spellcheck function indicated an error with a red underline, the participants very rarely right-clicked on the word to reveal potential alternative spellings. However, that study also showed that the learners referred to online dictionaries and typed in different spellings until they could find alternative words with no red underline. While such findings indicate the limited role played by the computer in the process of spelling correction, they show that the computer

was clearly part of the process and therefore cannot be studied separately from the interaction and the language used. It could be concluded from these findings that in a CALL study that adopts the ecological approach, the use of technology is perceived as an integral component of the interaction that involves the emergence of language use in the CALL environment – a perspective that helps to focus on the ways in which technology is used in the CALL environment.

Perceiving the use of technology in a CALL activity as an integral part of the language learning process aligns with the position within CT that language emergence arises from the interaction of the components within a learning environment (Ellis, 2008a; Larsen-Freeman, 2014a; MacWhinney, 2006). Also, as an approach within which the learner is perceived as an active participant and the CALL environment as one that provides opportunities for the learner to work according to his/her own interests and experiences, the ecological approach can be linked to the concept of affordances (a component of the theoretical framework in the current study) within which it is argued that language development is more about the way in which agents (learners) relate to a cue(s) from the learning environment and act based on the way they relate to that cue (van Lier, 2004). It follows from these positions (that emphasise the process of language use and the ways in which learners relate to cues in the CALL environment) that the ecological approach is well suited for investigating bottom-up processes of language use emergence that occur within collaborative CALL environments.

2.2.2. The use of technology in collaborative CALL environments

CALL research indicates that when technology is used in a learning environment, it supports a number of aspects of the learning experience. For example, in a study that investigated what learning in today's technology-enhanced environment means (Conole, 2008), data from a total of 427 surveys, 85 audio logs and 14 interviews were collected from participant learners in four Higher Education institutions. The participants were from various subject disciplines, including languages and linguistics. In that study,

it was found that students used technologies to support all aspects of their learning processes which included communicating with their tutors and with other learners, finding and managing learning materials, and creating assignments and presentations. The study concluded that ‘‘technologies appeared to be integral to learning for all the students’’ (Conole, 2008, p. 126) as they appeared to be central to how the learners ‘organised and orientated’ their learning (ibid.). While this lends support to the ‘normalised’ role of technology in facilitating (language) learning, it does not address how the other components in the studied learning environments related to the emergence of language use instances. The current study sought to address that gap by developing an understanding of the ways in which the process of language emergence relates to the use of technology as well as the other components in the CALL environment.

Previous CALL studies have also identified three main roles of technology in a (language) learning environment: as a tutor, as a tool and as a medium (Kern, 2006; Levy, 1997; Wu, 2015). However, none of these individual roles captures the role of the computer as an integral and ecological part of the language development in the CALL environment. For example, the role as a tutor implies taking over the teacher’s role by being the source of instructions, guidance, feedback, and assessment (Levy, 1997). An example of this role is the tutorial system known as PLATO, which was in use in the 1980s, featuring extensive drills, grammatical explanations, and translation tests at various intervals that the learners worked on individually (Warschauer & Healey, 1998). However, other studies claim that for the computer to be part of the language learning environment, it does not play the role of a tutor who guides or evaluates learning, but it should be used as an enabling and facilitative element of learning within that environment (as in Harington & Levy, 2001; Higgins, 1983; Warschauer, 2000). Where it is used as a facilitative tool, it encourages the learners ‘‘to explore and be creators of language rather than passive recipients of it’’ Warschauer and Healey (1998, p. 58) argue.

Previous CALL studies have shown that understanding the role of online affordances helps to design learning activities that can facilitate language learning. For instance, one study explored the role of the affordances of online tools (Second Life and Skype) in the development of L2 listening comprehension skills of 35 L2 learners aged 18 to 30 (Levak & Son, 2016). Qualitative and quantitative data from interviews and tests were collected and compared. It was found that the learners' prior knowledge of the online tools affected their choices. For example, the learners' previous use of Skype as a tool for communication led to more use of Skype by those learners for the purpose of introducing and discussing among themselves. Also, the learners associated the maps on Second Life with the activities where they had to discuss and ask for directions. It was thus concluded that ''Second Life and Skype demonstrated that they shared many affordances for developing listening comprehension'' (Levak & Son, 2016, p. 214). It can be understood from this conclusion that the affordances of technology that facilitate language development are constructed based on the learners' previous use of the tools. However, this conclusion places more emphasis on the tool itself rather than the learning opportunity in which the learners used Skype and Second Life in a way to achieve the activities' goals. Because within the ecological approach learning opportunities have been argued to occur when cues available in the environment match the learner's goal which fuels perception and leads to further action (van Lier, 2004), it was decided in the current study to investigate the emergence of authentic language use in the CALL environment based on the ways in which the learners relate to the components of the CALL environment.

Although the description of the role of the computer as a tool appears to be appropriate as it means (a) being the provider of access to materials for the learners to use and complete the activity (Kern, 2006; Levy, 1997), and (b) that it facilitates the mediation process of language development (Tanaka, 2005, Zeng & Takatsuka, 2009), it has been argued (Warschauer, 1999) that this description still does not fully reflect its integral role within CALL as an environment for language development because if the computer is treated as an assisting or enhancing tool, it becomes an instrument external to the

learning processes within that environment rather than part of the ecology of the language development process. These arguments helped form the basis for the current study to adopt the latter position. The third role of the computer, technology as a medium, or as the provider of sites for communication (Kern, 2006) is not appropriate for this study because, as argued within the ecological approach, the computer in the CALL environment is not the site of communication but an integral element of the language use process, alongside other elements.

One of the main features of the computer use in the CALL environment is the connection to the Internet through which the learners can access the Web and other means of communication such as emails. Previous studies suggest that having the Internet as part of communication and a source of information in a language learning environments affords a variety of opportunities for language learning where learners can negotiate meaning and make their own choices (Ahn, 2016; Heift & Chapelle, 2011; Trinder, 2015). Research on Computer Mediated Communication (CMC) has revealed that Web-based language learning activities that involve meaning negotiation afford opportunities for language development. For instance, a case study was carried out to examine small groups' interactions in wiki collaborative writing and how learners scaffold each other during joint wiki writing (Li & Zhu, 2017). To address the role of scaffolding in the wiki-based interactions, that case study focused on the patterns of interaction in wiki-based collaborative writing as well as students' wiki outcomes in an English for Academic Purposes course. One of the findings was that meaning negotiation patterns were influenced by the learners' style of communication (e.g., being approachable or not) and by the way the learners perceive the goals of the activity. This finding illustrates a link between the interaction patterns in a Web-based language learning environment, and the way in which the learners perceive the goals of the activity. This finding informed the current study's choice to examine the learners' use of language in the CALL environment in relation to the activity's goals as perceived by the learners.

Furthermore, Li and Zhu's (2017) study not only shows a link between the interaction patterns in Web-based activity, but it also indicates the complexity involved in the way the learners collaborated with each other to achieve the goals of those activities. Similar findings have been reported in other studies that focused on learners' engagement patterns and meaning making in different Web-based activities, e.g., Wiki (Kessler & Bikowski, 2010), Web.2.0 (Liu, Wang & Tai, 2016), desktop videoconferencing (Satar, 2016), Google Docs (Abrams, 2016), and Skype and Second Life (Levak & Son, 2016). All these studies highlight the role of the learner (e.g., cultural background and communication style) and the activity (e.g., structure and goal) in constructing meaning negotiation opportunities, and reveal how patterns of interaction in CALL environments are complex and dynamic. However, they do not address whether the features of the Web-based activities had any direct influence on the patterns of interaction that were studied. This gap in the literature informed the decision in the current study to examine how the components of the CALL environment together interact and give rise to such complex and dynamic patterns of interaction.

In addition, CALL research has shown that with freely available sources of information, such as the Web, the CALL environment can facilitate the construction of variable language learning opportunities in which learners negotiate for meaning and make choices (Kern, 2014). As has been argued, a Web-based language learning environment ''affords searchable access to a vast array of texts, films, music, news, information, pedagogical resources, sounds, and images from around the world'' (Kern, 2014, pp. 340-341). However, as it has been also noted, ''information and knowledge are not the same thing, and the availability of the one does not itself foster the growth of the other'' (Derry, 2008, p. 507). The description of technology-based language learning environments where learners can negotiate meaning as 'emancipatory' in which ''learners can create their own occasions for language learning'' (Levy, 2015, p. 556) suggests that the value of technology-based (language) learning environments is in their potential for affording opportunities for learners to construct their own meanings based on

their own interests and experiences via active involvement, interaction and communication (Collentine, 2011; Derry, 2008; Peng, 2011; van Lier, 2004).

Technology-based language learning environments have also been described as learning environments where learners are actively and collaboratively involved (Thomas, 2017). It has been argued that Web-based learning environments, where learners are connected with infinite and variable sources of information and tools, promote creativity and the construction and communication of creative ideas (Coiro, 2003; Dugartsyrenova & Sardegna, 2016; Lin, Preston, Kharrufa & Kong, 2016). As discussed in Chapter Three, within CT, the role of variability and nonlinearity in language development is emphasised (de Bot, Lowie & Verspoor, 2007a; Larsen-Freeman & Cameron, 2008), as it is argued that the more different linguistic forms from which the learners can draw, select and use, the more likely language development is to take place (Verspoor, Lowie & Van Dijk, 2008).

Another feature of the CALL environment that has the potential to promote variable opportunities for language use is its capacity to provide face-to-face as well as online communication. Being a face-to-face activity that also involves the use of the Web, collaborative CALL environments comprise multiple levels and multiple layers of communication. With such features of communication, the collaborative CALL environment has the potential to establish high degrees of the so-called 'social presence' which has been defined as "the degree of salience of the other person in the interaction" (Short, Williams & Christie, 1976, p. 65). It has been argued that the salience of the other person (learner or teacher) is an important quality in CMC as it promotes willingness in learners to take risks through participation in interpersonal exchanges (Kehrwald, 2010). This argument has been further supported by Satar (2015), who reports a number of studies in which it was found that the social presence in CMC fosters learners' satisfaction with learning (Gunawar-dena & Zittle, 1997), makes communication more natural

(Lowenthal, 2010) and helps learners manage turn-taking (Bee Bee & Gardner, 2012).

According to literature on perceptual salience, learners' attention is naturally drawn to parts of the input that are perceived to be prominent, and the perception of prominence of words is an outcome of language learning (Carroll, 2012). The role of the computer in enhancing the perceptual salience of target linguistic features was emphasised in a study that investigated the effects of processing instruction and structured input (activities to help learners make a form-meaning connection) on the development of the subjunctive in Spanish adjectival clauses (Russell, 2012). In forming four experimental groups, computerised visual input enhancement (VIE) was combined with processing input (PI) (i.e., constructing intervention that alters problematic, unhelpful processing) and with structured instruction (SI) (i.e., involving a primary focus on form). The aim of that combination was to increase the salience of the targeted grammatical forms. These four groups were later compared with traditional instruction (TI) (i.e., beginning with explicit explanation of the target grammatical form). The findings indicate that the computer, when used to provide VIE, enhanced the salience of the target linguistic forms. That is, VIE enhanced the perceptual salience of the target language. Although the results did not indicate a significant difference when input was provided with or without VIE, it still showed that the learners did benefit from the use of the computerised VIE as they scored higher in the post-tests compared to those who did not have VIE. However, what that study does not address is how the learners related to the specific cues in the VIE and how that relation influenced their language use. Because language learning opportunities are argued to be constructed based on how learners relate to cues in the learning environment (van Lier, 2004), it follows that the emergence of language use instances should be investigated in relation to how learners perceive language features in the collaborative CALL environment.

A number of studies have found that a learning environment that involves the use of multi-channels of input and instruction influences the salience of the target linguistic features. For instance, the study described above also found that including more sources of instruction and input in the learning environment enhances language salience. In such a multi-channel learning environment, salience "impacts the data that learners make available to other internal processors and knowledge sources … any instruction that fosters good comprehension ought to foster [development]" (VanPatten, 2011, p. 276). These arguments indicate that the use of technology is what facilitates the provision of multi-channel communication in these studies; hence, 'technology presence' could paly a role in promoting salience in the CALL environment.

Previous studies have shown a relationship between the technology presence and the learners' performance in technology-based language learning environments. For example, in a study that reviewed research on the value of the use of technology (hypermedia and online networking tools) in the language classroom, it was found that there was a considerably growing body of research that supports the effective role the computer can play to increase the quality of students' language performance (Pennington, 2004). Lin (2015) carried out a similar study to summarise research on CMC activities in second language learning for the period 2000-2012. One of the conclusions of Lin's study was that interactions mediated by computers/technology generate similar or even superior opportunities for L2 learning than those found in face-to-face settings. One reason for that is that technology-based learning environments could have, in addition to the face-to-face interaction layer, a technological layer which is added to the communication process, Kern (2014) argues. In the case of the collaborative CALL environments in the current study, the additional layer of communication comes not only from the Web but also from the other learners, the teacher or from other materials that are part of the collaborative CALL activity. This leads to the concept of affordances used in this study to investigate the learning opportunities in the collaborative CALL environments. As discussed in Section 3.4 of the Theoretical Framework chapter, the

concept of affordances has been presented in various studies as a useful theoretical concept to explore the ways in which learners realise and respond to learning opportunities (van Lier, 2000).

Moreover, previous research indicates that the use of technology in collaborative CALL environments provides a variety of learning opportunities where learners can use linguistic and non-linguistic means of communication. Studies in the field of asynchronous CMC where learners communicate via a Web-based platform like online forums and emails have shown a potential for language development, but they have been also criticised for the lack of non-linguistic means of communication. For example, a synchronous CMC study used logs of tandem chat-based feedback to examine the effect on the learners' metalinguistic awareness of grammatical forms (O'Rourke, 2005). The findings showed that when interlocutors negotiated meaning, they used more direct linguistic forms to clarify meaning and use of certain linguistic forms. That use, it was found, led to relatively more focus on form than meaning. It was indicated in that study that the absence of non-linguistic cues in asynchronous CMC (ACMC) was an influencing factor in the nature of the metalinguistic focus (being on form or meaning). The learners benefited from the textual nature of the tandem logs used in that study as it increased the potential of noticing of form, O'Rourke argues. However, that study concluded that the total dependence on a single channel for all communication burdened the individual's conscious cognitive processes. A similar conclusion was also reached in another study (Smith, 2003) which was conducted to find out how learners negotiate for meaning during task-based CMC. It was found that in CMC ''a certain degree of support is stripped away concentrating the entire burden of communication on written characters" (Smith, 2003, p. 47).

Research on synchronous CMC (SCMC) also reveals similar findings. For instance, studies that used different communication software, such as virtual chatroom on Blackboard (Morris, 2005) and MSN messenger (Bower & Kawaguchi, 2011), reported that negotiation of meaning was at a very low

rate; for example, 0.8% of the total instances when negotiation was required, as in Bower and Kawaguchi (2011). This shows that the immediacy element in communication in SCMC does not improve the shortcomings of the ACMC concerning communication and meaning making. In their study, Bower and Kawaguchi (2011) argue that the reason for the low explicit corrective feedback is that SCMC tasks lack structure for the activity to develop through, and one way to resolve that shortcoming is through the presence of the teacher to aid with structuring the activity and feedback provision in such Web-based activities. In collaborative CALL environments, learners have the opportunity to use non-linguistic cues in a face-to-face manner with their peers and with the tutor. It can be understood, therefore, that interaction and meaning negotiation within the instances of language use opportunities of the collaborative CALL environments combine the advantages of synchronous CMC (e.g., opportunities for direct and explicit linguistic feedback) as well as of face-to-face interaction (e.g., facial and gestural cues). This understanding contributed to the decision taken in this study to take into account the ways in which language-based and non-language-based interaction relate to the emergence of the learners' instances of authentic language use in collaborative CALL environments.

2.2.3. The teacher in collaborative CALL environments

Previous studies have shown that although the teacher is not present all the time within the technology-based learning environments, s/he still plays a role in the way the learners perform. It has been argued that the learning opportunities constructed in technology-based learning environments do not mean that students, on their own, will engage in productive communication (Derry, 2008; Heift & Chapelle, 2011). This argument supports the position that the teacher's role in the CALL environment is still important. Previous studies have shown that the teacher's involvement in technology-based language learning environments is essential as it affects the way the learners carry out language learning activities. For example, studies on the features of the communicative interchanges in computer-based language learning activities have shown that the teacher remains the expert and general

authority figure especially concerning instructions and feedback (Best, 1997; Lam & Lawrence, 2002). Furthermore, studies on CMC support the evidence that teachers still play an essential role in CALL activities. In a study of text-based synchronous CMC environment (O'Rourke, 2005), it was found that in a CMC environment (e.g., a virtual reality system in which several users are connected at one time), pedagogical interventions were necessary to encourage learners to take advantage of the affordances of the technology-based learning environment. It was concluded that in CMC environments, there is a substantial role for pedagogical interventions in awareness raising and task setting. This effect of the tutor's interventionist role is also argued for by other CMC studies (e.g., Mercier, Higgins & Joyce-Gibbons, 2016; Tanaka, 2005; Zeng & Takatsuka, 2009). In collaborative CALL environments, the teacher has the opportunity to perform a similar pedagogical role, as s/he sets up the collaborative CALL activities and is present whilst learners carry them out. As these studies support the idea that the teacher plays an important role in the way technology-based language learning activities are carried out, it was decided for the current study to take the findings in these studies into account by including the teacher in the data, where the teacher was involved in interaction within the activities.

Previous research on how learners perceive technology–based language learning environments shows that learners recognise some benefits in using technology-based learning resources, but they also show preference for having those tools as part of a teacher-led learning environment. For instance, in a survey-based study (Trinder, 2015), participants ranked online dictionaries, TV/radio/video clips, films on DVD/BluRay, and online news sites/journals at the top of a list that included a number of social and academic technological tools. In the open-response section of that survey, the participants explained why they ranked those tools at the top by stating that they provide them with ''the chance to improve listening skills, to get used to different accents and informal language whilst enjoying authentic, rich visual entertainment [as] in the case of films'' as reported in Trinder (2015, p. 91). However, in that survey a number of respondents (20%) indicated that they preferred teacher-led classes for studying new language

and for the same reason, 24% stated that they preferred blended learning environment (combination of teacher and technology-mediated environments). Those who chose blended learning thought their option provided “variety”, and “the best of both worlds, with the teacher offering guidance and structure, and technology giving the option to choose their own focus of practice,’’ Trinder (2015, p. 96) claims. These findings indicate the significant role of the teacher in the collaborative CALL environment as a blended language learning environment, and is therefore a perspective that the current study accounted for when examining the learners’ language use in collaborative CALL activities.

Additionally, one of the teacher’s roles discussed in the CALL literature is what is referred to as ‘moderator’ by which the teacher aims at promoting autonomous learning. For example, in the CMC environment, it has been argued that a teacher with the role of a moderator is essential for an effective learning to occur during the collaborative knowledge creation process (Churcher, Downs & Tewksbury, 2014). This description of the teacher’s role as a moderator aligns with the description of the teacher’s role as a facilitator. As a facilitator, Warschauer and Healey (1998) argue, the teacher’s role in CALL is more than that of a directive giver of information but lies in being able to respond to the needs that students have as they carry out a CALL activity, not just what has been set up ahead of time. This view of the teacher as a moderator or facilitator in Web-based learning environments is also consistent with the argument that one of the teacher’s roles in technology-based learning environments is to create stress-reduced learning atmosphere, with elements of virtuality to encourage learners to experiment and reflect easily, if not freely (Schwienhorst, 2003). After exploring the teacher’s role in computer-mediated language lessons, using emails, Schwienhorst in one of his conclusions states that:

> the provision of a motivating and authentic learning environment (can) be important for learners to become more autonomous, but these alone are not sufficient. Reflective, social-interactive, and experimental-participatory learner behaviour needs to be fostered by an appropriate

> manipulation of the learning environment … If we want learners to assume responsibility for their learning process, then they must be given control over it, supported by a rich learning environment, peers, and teachers (ibid., p. 441).

This sheds light on the role of the teacher as well as the other components in promoting autonomy within CALL activities and indicates when and how the CALL environment might be more effective. Arguing that a technology-based learning environment has the potential to be most effective when the teacher sets it in a way that promotes autonomous learning and a stress-free environment of reflection and interaction (Ellis, 2008a; Lamy & Goodfellow, 1999), it was understood that the teacher in collaborative CALL environment plays a role that impacts how effective the CALL environment can be. In line with these arguments and findings, it was decided in the current study to include both student-student and student-teacher interaction within the activities investigated.

Additionally, these arguments that link the teacher's role in a CALL environment with learner autonomy align with findings in other studies. For instance, through a case study conducted during a computer-based project in a university Spanish-as-a-foreign-language class, Lam and Lawrence (2002) investigated the roles of the teacher and the learners. The study consisted of 33 students (13 native speakers of Spanish and 20 non-native speakers) working in groups of two who had to choose a topic relevant to the world of business and create an overview of the topic in the form of a webpage. The study reported that the teacher assumed an active role during the activity as s/he was constantly circulating from one group to another attending to questions related to technical and language issues. The study concluded that in a computer-based language activity, the teacher's managerial role might somewhat be diminished, but s/he largely maintained an expert role and learners still depended heavily on them, which was "an active dependence, not a passive one" (ibid., p. 311). This conclusion indicates that in a collaborative CALL environment in which the teacher plays a managerial role, learners can still be active in terms of working at their individual pace and in

relation to their own interests and experiences, as explained earlier in 2.2.2 and in more detail in the following section.

2.2.4. Autonomy in collaborative CALL environments

When learners have the opportunity to use technology, they "take control of their own learning, on their own time, and for their own purposes" (Collentine, 2011, p. 50); in other words, the use of the computer in CALL environments has the potential to promote an autonomous learning environment. Previous studies have indicated that such language learning environments have positive effects on the learners' language learning experience (Schwienhorst, 2002; 2003). For example, in one study that was conducted to examine whether learners' choices in a computer-based language task would have an effect on the accuracy of their production (Collentine, 2011), 58 third-year university-level learners of Spanish worked in pairs on two tasks. During the first task, learners worked on 3D images with instructions in Spanish to find particular clues about a missing person, while the second task required learners to communicate via iChat with a partner to try to solve a murder mystery. Using data from the user-tracking recordings that was automatically created by the computer software, particular statements were identified that helped to analyse and assess the participants' use of particular linguistic features. Although the findings did not indicate a significant link between any of the two tasks and accuracy in the learners' output, they showed that there was a relationship between autonomy, input and production of linguistic complexity. It was concluded that being able to make choices in a computer-based language task does not necessarily lead to accuracy; however, the learners' choices, in addition to the subsequent input learners received, together affected their production of more complex output. That conclusion has informed the present study's consideration of how the integral use of the computer in the CALL environment relates to what the learners do (in terms of language use, meaning negotiation and making choices) and the cues they perceive (e.g., from the Web or from discussion stimulated by the Web).

In addition, previous CALL studies have shown a link between autonomy and collaboration. Kessler & Bikowski (2010) carried out a study to identify (among other goals) some appropriate strategies for communicating as a collaborative member of a group, and to investigate how the development of collaborative autonomous language learning abilities can inform computer mediated language learning. To achieve that, the study investigated the nature of individual and group behaviour when attending to meaning in a long-term wiki-based collaborative activity (a 16-week long wiki construction). That behaviour was also examined in relation to the students' collaborative autonomous language learning abilities. The wiki activity was designed to provide the participants with a space where they could synthesise the content of a course they were taking. The course was focused upon teaching English through the content of culture, and the wiki activity was to define the term 'culture'. To assist students in building autonomy, the course involved discussion boards, video conferences, virtual presentations, collaborative group projects and accessing a variety of streaming media. These kinds of activities, it has been argued, promote learners' autonomy because they could provide them with a space where they synthesise the content of the course on their own (Littlewood, 1996). The results of that study showed that "students demonstrated autonomy as collaborative learners more often than not" (Kessler & Bikowski, 2010, p. 49). This finding indicates the value of exploring further the link between collaboration and autonomy.

Several studies have also found that learners in Web-based learning environments have various opportunities to self-regulate, which eventually leads to improving their motivation and confidence (Beatty & Nunan, 2004) and to enhancing their reading comprehension (Dreyer & Nel, 2003; Spörer, Brunstein & Kieschke, 2009). These findings are further supported by a study that explored how self-regulated learning strategies improve the learners' self-efficacy in Web-based tasks (Chang, 2005). In that study, the participants were free to choose one of several topics that were uploaded onto the course website by the teacher. They then had to discuss it online with the other participants and then complete activities that were designed for the purposes of that study. As part of carrying out those activities, the

participants were asked to record their learning using different forms, writing review records of their own performance, making comparison tables to monitor their self-learning processes, and to list strategies and the study time they may need to adjust for future learning. One of the findings of that study was that the participants related their learning outcomes to the effort they made in the activity. As this finding makes a link between outcomes and effort, it indicates that the participants were aware that they were responsible for their own learning, Chang argues. Similar findings were also revealed in other studies of Web-based activities. For instance in a study of collaborative Web-based activities, it was found that the learners manifested self-responsibility as every member took the initiative to complete their part in the activity (Li & Zhu, 2017). In that study, there was also 'collaborative agency' which was reflected in scaffolding and instruction that group members provided to each other in pursuit of the activities overall goals. However, as indicated by the procedures and methods of those studies, those findings were based on the way in which the participants processed the Web-based materials. That is, the ways in which the Web-based materials themselves influenced those processes was missing in those investigations, something that is addressed in the current study through accounting for multimodality in the CALL environment.

Studies of multimodal Web-based environments (discussed in more detail in Section 2.2.5) have explored the role that Web-based materials play in creating autonomous leaning environments. For instance, in a study that used multimodal Web-based materials, it was found that multimodal Web-based activities facilitate L2 writers' noticing and self-revision and encourage a focus on personal language development processes (Dzekoe, 2017). This finding has been taken into account in the design of the current study in that the effectiveness of collaborative CALL activities is linked to how the CALL environment promotes learner autonomy and self-directedness. Littlewood (1996) has proposed a model that links autonomy with motivation, confidence, knowledge, skills, willingness and ability. These components, he argues, are interlinked because the more linguistic knowledge and skills the students have, the more confident they are likely to feel when asked to

perform independently; and the more confident they feel to perform independently, the more they are likely to be able to expand and develop their knowledge and skills in order to perform effectively.

Previous research on autonomy has also explored how self-directedness is related to language development and collaboration. For example, a study was carried out to explore the links between self-directedness for language learning and English language learning attainment among Chinese university students (Gan, Humphreys & Hamp-lyons, 2004). Students were categorised as successful and less successful based on two criteria: (1) a large-scale standardised test and (2) performance in class as perceived by their own teachers. The researchers used multiple data collection tools including interviews, diaries, and follow-up emails to triangulate their findings. The findings showed both similarities and differences in how learners perceived their own processes of language learning. Successful learners, according to Gan et al (2004), are those who are able to sustain their performance ‘‘towards a learning goal at their own pace” (p. 240). The researchers also concluded that attitudes, strategy use, and motivation “tend to be situation and person-specific and that they are perhaps a consequence of goal orientation, personal choice, engagement with different kinds of learning activities, and social interaction” (ibid., p. 240). The implication of this conclusion may be that the interaction and collaboration between learners (and between learners and teachers) in the collaborative CALL environments might be a significant element impacting language emergence in this learner-centred environment.

Previous studies have revealed that collaborative CALL, as a technology-based learning environment that promotes engagement, has a potential to promote learner autonomy. In an experimental study that investigated the role of the motivating styles of teachers on promoting learners’ autonomy, it was found that the more teachers used autonomy support techniques (facilitative techniques rather than interference) during instruction, the more behaviourally and emotionally engaged their students were (Reeve, Jang,

Carrell, Jeon & Barch, 2004). As discussed earlier in 2.2.2, some CALL studies have found that the use of technology in language learning environments increases learners' engagement. For instance, Gasmi and Thomas (2017) conducted a study to explore the influence of a technology-enhanced flipped teaching approach on the learners' engagement. In the 'flipping' part of that study the learners had access to materials that introduced the course and its theoretical aspects through YouTube videos and collaborative Web-based applications, and in the 'in class' part, the learners were involved in collaborative tasks in groups and in pairs with the aim of constructing texts. The findings of that study were consistent with those reported by Reeve et al (2004) in that ''most students were behaviourally and emotionally engaged in the sense that they persevered and persisted when they were faced with difficulties in completing the assigned tasks'' (Gasmi & Thomas, 2017, p. 242). However, in the latter study it was also found that at the level of self-regulatedness, the learners were less engaged in the activities. This indicates that in a technology-based learning environment, the role of autonomy in language emergence might be studied in relation to the learners' level of engagement, but it is essential to explore the ways in - and levels at - which the learners engage with the components of the language learning environment.

In the CALL literature, autonomy has been examined through observing and reporting on the cognitive and social aspects of the language development processes in CALL. It has been suggested that in language learning tasks that involve the use of technology, language development can be understood through three perspectives: *individual-cognitive*, *social-interactive*, and *experimental-participatory* (Schwienhorst, 2002; 2003). The role of actualising these perspectives is believed to be essential for maintaining the learners' autonomy in an environment like CALL, and they can be also viewed as approaches to learner autonomy. The individual-cognitive view states that learners constantly try to improve their existing language system. This particular view is relevant to the present study because it emphasises the role of learners' consciousness and awareness of the development of their language. Thus, when they are working on a collaborative, computer-

based activity, the learners' language use might be fostered by occasions of self-reflection on their own language as well as on those of their peers. The second perspective, the social-interactive, refers to the interpersonal interaction and collaboration in (language) learning, which can provide means and opportunities to increase consciousness (ibid.). Like the first two perspectives, the experimental-participatory perspective highlights the importance of using self-reflection techniques to promote learners' autonomy. Such techniques (reflective writing or speaking) could be used as tools by which learners can monitor and evaluate their own learning progress. According to Schwienhorst (2002; 2003), this can be achieved by providing easy-to-use authoring tools with open and participatory design such as emails or computer games. While these three perspectives and their impacts on the learner's autonomy represent features of the way in which the learners perform individually and collaboratively, they do not explain how these features are related to the Web-based materials. Given this gap, it was decided in this study to examine language emergence not only in relation to how learners interact in the collaborative CALL environments but also how the CALL materials and perceived objectives influence that interaction.

2.2.5. Multimodality

Contemporary technologies facilitate the combination of various modes of communication such as image, sound, written language, and animation among others (Álvarez, 2016) – in other words, multimodality. CALL environments therefore correspondingly offer obvious opportunities for multimodal approaches to education by including materials and teaching approaches that stimulate several sensory modes of communication simultaneously, for example, auditory, visual or tactile, and "each of the modes available [in CALL environments] provides specific potentials and limitations for communication'' (Kress, 2005, p. 5). While each mode can be viewed independently, nevertheless the process of sense-making of any interaction as a whole involves the contribution of each mode in its interaction with all other modes (Kress, 2015), as explained in more detail later in this section.

Within multimodal learning environments and particularly in those that are technologically rich, there is a greater opportunity and expectation than in 'traditional' classrooms that learners will be active and autonomous agents (Abrams, 2016; Kress & van Leeuwen, 2006); that is, that learners will be "agents who are making meaning and producing texts and who are also constantly remaking the representational resources in the process [resulting in] a situation of permanent change'' (Hampel & Hauck, 2006, p. 6). In multimodal CALL, this agency means that learners choose their own reading path (Kress, 2003; Kress & van Leeuwen, 2006). Any study which examines language use within a multimodal, technology-based environment, must therefore take into account the various language and non-language based modes, and the combinations that learners select to work with in order to obtain, disseminate and transform information.

Much of the recent literature on multimodality in CALL has revealed a link between working on multimodal materials and learners' agency. One of those studies explored the role of multimodality in the learners' comprehension of a story which they acted out (Barton & Baguley, 2014). Data for that study were collected from videos (of rehearsals and the final performance), interviews, reflections, and from samples of students' work. Drawing on the theory of semiotics, which emphasises the integral role that all modes play in the process of meaning making (Kress & van Leeuwen, 2006), the study found that having to act out the story without the script, offered the learners an opportunity to choose the way in which they demonstrated and expressed their understanding. It was found that, the learners were active and self-directed in the way they performed in those multimodal environments. Also, with more rehearsals, it was found that both ''the complexity and level of expression increased understanding not only of the performance process but also the story'' (Barton & Baguley, 2014, pp. 104-105). While this lends more support to the argument for the positive role for multimodality in improving comprehension, it highlights the role of the multimodal environment in providing the learners with opportunities in which they make their own decisions concerning ways of understanding a language-related material.

It has been argued that multimodality is part of the dynamic meaning making process which is hard to separate from the concept of interaction, i.e., social as well as cognitive interaction (Jewitt, 2014; Kress & van Leeuwen, 2006; Levine & Scollon, 2004). That is, meaning in multimodal environments is dynamic and complex as it is, as Kress (2015, p. 57) argues ‘‘subject to the subsequent semiotic work of interpretation-as-redesign, by the person who engages with the message/ensemble’’. This argument is useful for this study as it indicates that investigating the ways in which the learner relates to the information s/he attends to in the collaborative CALL environment helps to investigate the processes of language emergence.

One feature of multimodal collaborative CALL environments that relates to their complexity is based on the learners’ variable points of entry and engagement with the CALL materials. As has been noted, one of the ways in which multimodal materials facilitate language learning is believed to be in their capacity to enable learners to enter a text, become involved with the English language and transform the text into a meaningful action (Xerri, 2016) because ‘‘each mode offers a different way into representation and focuses on different aspects of meaning,’’ as Jewitt (2005, p. 7) argues. This aligns with the call for structuring learners’ activities and participation in a way that makes access available and engagement encouraged in order to facilitate the construction of learning affordances (van Lier, 2000). In a study that analysed excerpts of text-image materials of two EFL textbooks, it was found that images were much more than mere visual reinforcement or space-fillers; but rather, they were entry points for critical discussions that can foster processes of meaning making (Weninger & Kiss, 2013). Additionally, other studies have emphasised that the learners’ entry points to the multimodal texts are facilitated by the way in which the activity is structured and by the teacher’s intervention (e.g., Liam, 2012; Weninger & Kiss, 2013). However, these studies do not address how students select an entry point and how that selection relates to the learners’ language use. Given this gap and considering the arguments for selecting entry points in influencing learners’ engagement and meaning making processes, it was taken into consideration

that exploring the learners' access points in the collaborative CALL environment might provide insight into investigating the process of language emergence within the CALL environment.

For learners to work effectively in technology-based multimodal environments requires skills and abilities both similar and different to those required in the comprehension of conventional print (e.g., Cho, 2014; Coiro 2003; Coiro & Dobler, 2007). That is because, as has been argued, being within a Web-based learning environment, meaning in environments such as CALL is distributed across different modes (Guichon & Cohen, 2016; Kress, 2003; 2005; Kress & van Leeuwen, 2006). Chan and Unsworth (2011) conducted a study to find if there was any evidence that learners integrated meanings from across various modes in a Web-based environment. Data were collected using surveys and interviews of 32 students after they worked on a number of Web-based activities. The 32 participants were streamed into high, medium, and low performers based on the state reading comprehension tests. The study used activities of three types, where (1) complementary meaning was distributed across image and text, (2) images provided additional ideational elements to the overall meaning, and (3) the ideational content of the text/image was opposed or at variance. Although the study showed that 84% of the students said that the Web was the first place for them to look for information for homework assignments and research, from the participants' scores, it was observed that the participants found those activities more difficult. That is, their performance was not influenced by the use of technology. The study concluded that Web-based learning activities have the potential for a greater engagement and enjoyment of reading for learners, but the learners need to be ''well supported in the additional skills required for the successful location, integration and evaluation of information'' (ibid., p. 196).

Similar studies have pointed out another issue about working with Web-based materials, where meaning is distributed across different modes. It was found that learners tend to become over-dependent on one mode to obtain

information from the Web (e.g., on images as in Risko, Walker-dalhouse, Bridges, & Wilson. (2011) and in Chang, Wang & Ma (2016)), reducing their opportunities to incorporate other aspects of meaning. This finding indicates a need for a level of multimodal competence for learners working on Web-based materials. In order to develop the learners' multimodal competence in a language learning context, it has been suggested that three types of skills are required (Guichon & Cohen, 2016). These were suggested after the authors reviewed a body of research on computer-based activities in which challenges in achieving the activities' goals were identified and necessary skills were required as suggested by both teachers and learners. Those three identified types of skills were:

- Semio-pragmatic: to go beyond their individual modal habits and preferences and to acquire a critical use of different modes
- Psychocognitive skills: make strong affective demands
- Sociocultural skills: intercultural awareness.

What is in common between these three areas is that they are about the learner as an individual, his/her habits, preferences, and cultural awareness. This also indicates a need for understanding the interplay between the individual learners and the Web-based materials and how that relates to the construction of the learning affordances resulting from a language learning environment like collaborative CALL.

As discussed so far in this section, research on multimodal environments show that learners work strategically as they navigate through multi-layer materials. For example, Coiro and Dobler (2007) conducted a study whose results added to our understanding of the ways in which learners perform in Web-based language learning environments. The aim of their study was to find out what characterises the reading process that skilled readers go through while trying to locate information on the Web. Eleven six grade learners were selected to participate. They were considered skilled readers based on their teacher's recommendations, their scores on a standardised reading test, reading report card grades, and a student questionnaire of

ability and experience in reading online. The data for that study were gathered from think-aloud protocols, interviews, and field observations of two reading sessions. While the findings of that study emphasised the role of multimodality of Web-based materials in engaging the learners, they also highlighted that skilled readers benefited from the multiple layers of texts which facilitated their inferring and reasoning processes. This finding supports the position that while reading online, learners synthesise meanings from across layers into ‘‘a coherent understanding of the material as a multi-semiotic whole’’ (Kress, 2015, p. 57). Also, in that study, it was found that skilled readers were involved in a cognitive self-regulated reading process that was intertwined with physical reading actions. As these findings indicate that learners tend to be strategic in the way they perform in a Web-based language activity, it was decided in this study to investigate the learning strategies employed by the learners in collaborative CALL environments because they could help to explore the process of language emergence involved.

2.2.6. Learning strategies

Research that has explored the purposeful actions which learners perform in CALL environments has linked the learners’ strategic actions and the ways in which they interact and make meaning. To understand the ways in which learners work on Web-based language learning activities, one study examined how learners of German as a foreign language analyse the content of authentic websites, not designed for pedagogical purposes (Abrams, 2016). Using a task-based design, the tasks that the learners worked on were based on a website of a popular German TV-show. That website featured text, images and videos, all embedded in different layers within the main website. Data were collected using surveys, interviews and documents (e.g., written assignments). While the results of that study confirmed the findings of previous studies that had claimed that learners construct meaning across different modes, it also highlighted the facilitative role of the learners’ online search literacy, such as the learners’ existing knowledge about the organisation of websites. Also, despite the study indicating that the majority

of the participants enjoyed working with real-world, authentic materials, there were a few who expressed having difficulty understanding even the gist and feeling overwhelmed with the authentic language used on those websites. Although those studies do not explain whether it was the structure of the task (being task-based) or the multimodal design of the activities, or a combination of both that affected the process of meaning making in those tasks, it still showed that the learners who were active and involved managed to produce what was required from them. The findings of Abram's (2016) study show that learners' previous knowledge of how websites are organised and their knowledge of how to navigate through their embedded layers facilitated achieving the requirements of that task. These findings informed the decision in the current study to explore the ways in which learners purposefully worked and the ways in which their prior knowledge influenced how they carried out the collaborative CALL activities.

Several studies have also shown that if learners are strategic in the way they carry out CALL activities they can help avoid cognitive overload that is caused mainly by levels of embeddedness in such activities. In a study that used interactive printed materials (traditional printed materials embedded with digital resources that are viewed through a computer device), the teacher played the role of a guide who provided technical and conceptual support to the learners (Nadolny, 2017). The data were collected from the logs of the activities that included 14 pages with a total of 62 digital items digitalised to include links to websites, embedded videos, slideshows, audio, and assessments. Not all digitalised pages contained the same number of embedded layers. That study aimed primarily at examining the learners' patterns of interaction in that environment. It was found that an increased number of digital items on the page were correlated with fewer interactions, which, according to the researcher, was due to a cognitive overload and being overwhelmed with the amount of information presented. While this finding shows that in collaborative CALL environments, multimodality can be counterproductive, it also underscores the significance of exploring the strategic actions that the learners take as they navigate through the

multilayers of the materials used in collaborative CALL environments and how such strategies might be linked to being overwhelmed.

In addition, a number of studies have shown that language learners adopt a wide range of learning strategies when they work with computer-based materials (Cho, 2014; Chou, 2012; Coiro, 2003; Coiro & Dobler, 2007; Park & Kim, 2016). One example of this is a qualitative case study that was conducted to find out what strategies English language learners use when they read computer-based texts at school and at home (Park & Kim, 2016). Data for that study were collected from (1) observations and the participants' verbal protocol reports, (2) interviews, (3) documents, and (4) field notes and reflective journals. The results showed that the participants applied 15 different strategies which were categorised into:

- Accessing strategies (e.g., typing a web address into the address bar, typing keywords into a search engine, clicking a hyperlink on an open web- site, and clicking a bookmark),
- Using their computer literacy (e.g., scrolling up and down, moving back and forth, and using the computer's input devices),
- Making critical decisions (setting up the reading purpose, previewing and evaluating the texts, and deciding which texts to read).
- Interaction (dialoguing, making a connection, and sharing an information source)
- Active participation (adjusting their reading patterns, monitoring their reading comprehension, inferring particular information from computer-based texts, and confirming choices and decisions).

The findings of that study highlight two aspects that informed the investigation in the current research study. Firstly, it was found that the participants in that study worked on multiple tasks and dialogues in nonlinear ways. Thus, in addition to being strategies that helped the learners carry out the reading tasks, those strategies relate to the aspects of language emergence that the current study sought to understand. As has been argued, contextual variables of a learning environment influence not only the choice

but also the success in using reading strategies (Cho, 2014; Cho & Afflerbach, 2015; Coiro, 2003; Kim & Park, 2016). Such findings formed the basis for the understanding in this study that exploring Web-based reading strategies in relation to the other components of the collaborative CALL environment can help to investigate the processes of language emergence in collaborative CALL environments. Secondly, because Web-based language learning materials are usually interactive and inclusive of multiple media forms, the participants in that study had control over the direction in which such learning opportunities progressed. Since in Web-based learning environments a reader makes continuous decisions about what to read and what to ignore, a reading path (Kress, 2003) (discussed earlier in 2.2.5) is constructed in relation to the reader's particular goal (Cho & Afflerbach, 2015). This idea of a self-selected reading path highlights the importance of studying Web-based reading strategies in terms of how learners relate what they read to what they need to find out. Based on this idea, it has been argued that for successful reading of Web-based materials, learners need to be equipped with skills that enable them to search, locate, and draw connections between diverse resources and what their goals of reading are (Coiro, 2003). This indicates that exploring the ways in which learners carry out Web-based language learning activities yields insight into the process of language emergence.

However, previous studies on the employment of strategic actions in technology-based learning activities have differed in linking learners' strategies to achieving objectives. For instance, when verbal reports in addition to computer screen moves of a group of classmates were studied in order to analyse their effective use of online reading strategies (Cho & Afflerbach, 2015), similar results to those reported by Park and Kim (2016) were found. The study considered those learners highly competent readers based on standardised test scores, grade-point averages, and teacher recommendations. The study used verbal reports of what the learners were thinking while reading on the Internet combined with their recorded moves on the computer screen. A number of strategic actions were identified that were shared by all the participants. Most of the strategies identified belong to

similar categories as the ones identified by Park and Kim (2016), such as creating a reading path, selecting information based on relevance and purpose and drawing on prior topical knowledge and prior online reading experiences. Since the main purpose of that study was to discuss and clarify the distinctions between reading skills (automatic actions) and reading strategies (liberate, goal-directed attempts), it concluded by proposing that successful online readers employ similar strategies as they work on a Web-based activity.

Nonetheless, previous research has also shown that the strategic actions employed by learners while carrying out a technology-based learning environment are not always an indication of successful outcomes. Reflecting on their own experiences as teachers, Afflerbach, Pearson and Paris (2008) note that sometimes learners take strategic actions in the way they work on an activity by which they link what they do or find to the goals of the activity, but such actions sometimes are inadequate or ineffective for that activity. Afflerbach et al argue that the means in which the learners choose to read could be seen as strategic actions but they do not ensure that readers will decode and understand the text successfully. In their study, they provide examples of some of these actions that were strategic but were not always appropriate for achieving the activity's goals, e.g., guessing a word based on its initial letters or choosing to read fast in order to finish before their peers.

The findings of the studies discussed in this section provide a sound basis for the decision in the current study to examine the ways in which the learners chose to interact in the collaborative CALL environment as they could shed light on the process of language emergence regardless of the correctness of their use. This decision was also informed by the argument within CT that every instance of authentic language use contributes towards language change and development (Davis, Phelps, Wells, 2004; Ellis, 2008a; Larsen-Freeman, 2011).

2.2.7. Dialogic feedback

In a technology-based language learning environment, it has been argued that when practice is meaningful and deliberate, and when feedback is provided, both input- and output-oriented approaches can facilitate the learning of complex linguistic structures (Collentine & Collentine, 2015). Technology-based learning environments provide instances where learners are able to get help with or feedback on their language as well as to engage in conversation and negotiation of meaning with another speaker of the language (Heift & Chapelle, 2011). What is different about the feedback learners can receive in collaborative CALL environments (from that of CMC, for instance) is that it is dialogic, immediate and 'flexibly responsive' (Collentine & Collentine, 2015). Provision of immediate feedback has been identified as an essential element in collaborative learning (Kitade, 2008). Language development in collaborative CALL environments can be facilitated by "the learner's ability to generalise what had been appropriated … and through the kind of help that is jointly negotiated between experts and novices" (Aljaafreh & Lantolf, 1994, p. 480). The online and offline interaction within CALL environments provides the learners with more opportunities to receive immediate feedback. Therefore, there is a potential in this study that feedback would be provided by dialogues between learner and learner, learner and computer and/or learner and tutor. As has been argued, dialogic feedback enables learners to understand new task components and requirements that novices would be unable to achieve without assistance (Kitade, 2008).

Since a collaborative CALL environment is one in which learners can interact face-to-face as well as online, immediate feedback can be provided in various ways. Online annotation such as highlighting content on the screen or adding comments is one of the computer-based tools for learners to seek or offer immediate feedback in Web-based activities. Research on the use of online annotations as dialogic feedback has shown positive impact on reading comprehension in Web-based environments. For example, Yeh, Hung and Chiang (2016) conducted a study to examine whether learners

make progress in their reading comprehension when they use online annotations. Using Google Docs, the participants, who were registered in a freshman English vocabulary and reading course carried out a number of tasks that involved marking and annotating unknown vocabulary with definitions, deriving the meanings of difficult concepts through group discussions, underlining important sentences and adding notes to generate possible comprehension questions for each other. The data were generated from the learners' scores on pre- and post- tests and from analysing the content of the Google Docs forms where the learners put their annotations. It was found that with the on-going face-to-face and online discussions on the chatrooms, the participants obtained feedback from peers and from the instructor. For CALL studies that investigate language use in collaborative CALL activities of which online reading and writing is part, addressing the role of peer feedback in the student-student interaction could be useful.

In their study, Yeh et al (2016) also found that the participants compared their output (online written summaries) to their peers', and in doing that, they received indirect feedback on grammatical errors (e.g., plural nouns or verb agreements) and on overall structure (e.g., coherence). The participants' scores on the pre- and post-tests indicated that all of the participants improved their reading comprehension, to varying degrees. It was thus concluded that ''the reciprocal nature of collaborative dialogues that occurs through online annotations serves to support students' reading process, which in turn leads to their improved comprehension'' (p. 37). This conclusion is consistent with previous studies where it was found that collaborative dialogic feedback in the form of annotations facilitates online reading comprehension (e.g., AbuSeileek, 2011; Tseng, Yeh & Yang, 2015). Additionally, in a study on the learners' perception of the use of VoiceThread (a multimodal asynchronous CMC tool), it was reported that many participants ''underscored the need to combine out-of-class VoiceThread practice with F2F tutoring … because it increased their opportunities for immediate feedback and oral fluency development'' (Dugartsyrenova & Sardegna, 2016, p. 74). While these findings support the argument for the positive impact of the feedback (in forms of discussion and written

annotations) on the language development processes, they also indicate the importance of the features of the Web-based application in the provision of this kind of feedback.

Moreover, previous research that has explored the value of incorporating online as well as offline interaction in a language development environment shows a relationship between that environment and increasing interaction and feedback provision. Kitade's (2008) study discussed earlier aimed at examining the discourse structure that the learners engage in in a language activity where learners had the opportunity to have offline verbal interaction as well as online asynchronous discussions. In that study, learners of Japanese communicated with Japanese partners online. There was time interval between the online messages which enabled the learners to engage in offline peer interaction. The study found that: (1) when learners lacked confidence about their knowledge or hypotheses, they requested quick verbal assurance from their peers or the instructor; (2) the feedback provided by a learner contained a metalinguistic explanation addressing what the partner had overlooked. In that study, it was argued that the learners' metalinguistic episodes took place in a joint production context (i.e., joint writing), where a group/pair of learners, using the same computer screen, collaboratively discussed and decided how and with what content they should respond to their online Japanese partners. The study concluded that offline dialogue may compensate for the absence of tailored feedback in asynchronous CMC, and it may serve as an occasion for L2 learning and knowledge building. What is relevant to the present study is that being in groups or at least pairs, working on a joint activity, using one computer screen, and being involved in a dialogic interaction can all be features of an effective collaborative CALL environment. This finding is further supported by a survey-based study in which participants indicated that they prefer face-to-face communication over online communication because they think online communication is 'only virtual', 'not real', and 'feels artificial' (Trinder, 2015). It can be concluded from these studies that in collaborative CALL environments, which involves activities of online as well as face-to-face interaction, learners have the

chance to be involved in interactions whereby they foster their linguistic knowledge in a way they would not have achieved individually.

2.2.8. Collaboration in CALL environments

Collaborative interaction has been perceived in a number of CALL studies as an essential characteristic of the CALL environment. In collaborative CALL environments, learners collaborate as they interact with peers, teachers and other materials in order to achieve the activities' goals and objectives (Levy & Hubbard, 2005). CALL studies have differed in identifying what facilitates collaboration in the CALL environment. The computer, in one study, was claimed to be what facilitates collaboration when it is used as the link between the ways in which learners carry out the activity and achieving their goals within the CALL environment (Levy & Hubbard, 2005). In other studies, it was claimed that learner autonomy is the key element that promotes collaboration in the CALL environment (Kessler & Bikowski, 2010) as well as their motivation, knowledge and skill about using the computer (Warschauer, 1996). It follows from these claims that link collaboration with autonomy, motivation and learners' knowledge that in collaborative CALL environments, collaboration is the learners' choice. In collaborative CALL environments, the learners' choices could be supported and guided through the provision of comprehensible instructions and scaffolding (Beatty & Nunan, 2004) and through allowing them to make decisions and choices in relation to their interests and experiences (Kessler, Bikowski & Boggs, 2012), as explained earlier in Section 2.2.6. While these positions emphasise the role of the teacher in the collaborative CALL environment, as discussed earlier in 2.2.3, it also reflects the complexity of the collaborative behaviour in CALL environments, as it appears to be a complex process of interaction that might involve any possible direction between learner(s), tutor, and the computer.

The complexity of collaborative behaviour in CALL environments has been discussed in CALL literature in relation to autonomy. For example, in their study that investigated how learners attend to meaning in a wiki-based

collaborative activity, Kessler and Bikowski (2010) suggested combining the components of autonomy (i.e., willingness, ability, motivation, confidence, knowledge and skills; as proposed by Littlewood (1996)) with the idea that the use of the computer in CALL environments plays a key role in promoting collaboration. The following diagram was used in that study to demonstrate this complexity.

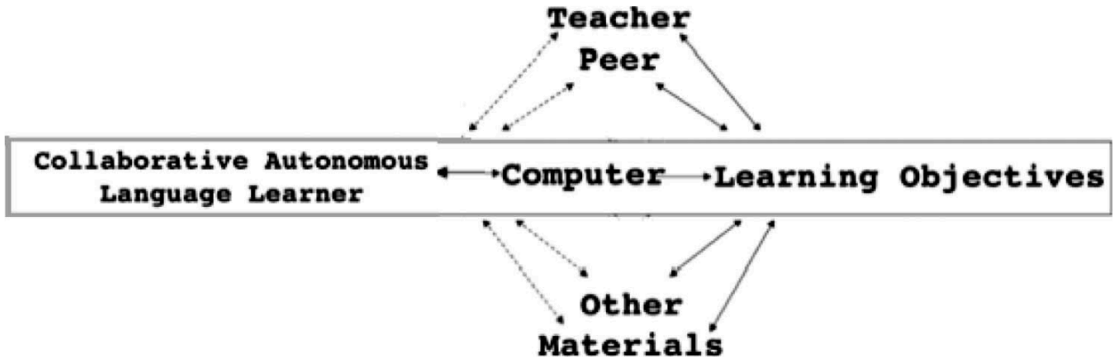

Diagram 2.1_ *CALL components_ Reproduced from Kessler & Bikowski, 2010, p. 55.*

However, as discussed in 2.2.2 and 2.2.3, the interaction in CALL activities has been described as a complex construct that consists of three types: learner-learner, learner-computer, and within the learner's mind which is not well demonstrated by this diagram. It has been argued in previous studies that collaborative interaction and dialogues in a collaborative language learning activity can be viewed not only as a means of communication but also as a cognitive tool (Beatty, 2010; Chapelle, 1997; Swain & Lapkin, 1998). This argument is supported by findings of a study of language-related episodes in the dialogues of two grade-eight French learners (Swain & Lapkin, 1998). The data for that study were collected from observing how the participants performed in a jigsaw task. Also, more data were collected from the storyline that the participants had to develop while working on the task. The analysis of those language episodes provided support of language communicative use "as enactments of mental processes and as occasions for L2 learning" (Swain & Lapkin, 1998, p. 320). Viewing collaborative interaction in CALL activities as a cognitive tool aligns in CALL research with

the position that interactive environments in which the computer is a central and integral component could alter the entire flow and structure of mental functions (Warschauer, 2005) because, as argued within the interactionist and sociocultural theories, collaborative interaction "provides good impetus for acquisition" (Chappelle, 2005, p. 55), and it can lead to higher mental functions being mediated through the use of the computer (Darhower, 2002; 2008). It follows from these positions regarding the complexity of the interaction in the CALL environment that collaboration is a social and cognitive phenomenon within the CALL environment and that examining the ways in which learners use the computer in order to achieve their goals in the collaborative CALL environment is useful to investigate how the student-student, student-teacher and student-computer types of interaction in collaborative CALL activities relate to the emergence of authentic language use instances.

Nevertheless, collaborative learning activities have been criticised for placing too great an emphasis on fluency (Pica, 1996; Swain, 1985). It has been found that when emphasis is placed on communication in communicative language learning tasks, little attention is paid to language itself and/or the cognitive and social processes involved (Pica, 1996). This clearly presents a challenge to the present research as both the cognitive and social aspects of language learning in the collaborative CALL environments are considered essential. However, it has been argued that this can be resolved by enhancing input, providing feedback on form and comprehensibility of learners' production, providing opportunities for learners to produce output, and by working on shared objectives of the task (Pica, 1996). For the current study, these represent characteristics that facilitate conducting effective collaborative CALL activities. To investigate the process of language emergence in collaborative CALL environments, it was decided in the current study to account for the influence of such characteristics on the relationship between the components within the collaborative CALL environment and language emergence.

Previous research has shown that collaborative activities can involve learners in processes in which they can think and work creatively in the classroom (e.g., Dillon, 2004; Miell & Littleton, 2008; and Rojas-Drummond, Albarra´n, & Littleton, 2008). Although the main topic of those studies is creativity in music, they are very much relevant to the current study as they stress the importance of "questioning and challenging; making connections and seeing relationships; envisaging what might be; exploring ideas; keeping options open and reflecting critically on ideas, actions and outcomes" (Rojas-Drummond et al, 2008, p. 8) which reflect the same concept of collaboration presented in this section. That is, as a collaborative learning environment that has the potential to promote self-directedness, as discussed in 2.2.5 and 2.2.6 above, it can also promote creativity. In addition to supporting creativity, collaborative activities that involve problem solving dialogues are believed to help in (linguistic) knowledge construction. According to the Problem-Based Learning (PBL) approach, in collaborative activities, learners engage in self-directed learning, identify what they need to learn in order to solve a problem, and then apply their new knowledge to the problem (Hmelo-silver, 2004). It could be understood from the PBL approach that when a problem arises (e.g., problems related to obtaining information) opportunities for problem solving are presented. As discussed earlier in Section 2.2.6, research has shown links between web-based problem-solving activities and learning strategies (e.g., Agosto, 2002a; Cho & Afflerbach, 2015; Coiro, 2003). Such links indicate that exploring the ways in which learners are engaged in problem-based dialogues is useful for an investigation into the process of language emergence in the collaborative CALL environments.

Research on collaborative patterns in CALL environments have shown that collaboration is linked not only to how involved learners are in the language-related activity but also to how they perceive their learning experiences. One case study, for example, was conducted to analyse group interaction by learners in collaborative writing task using wikis (Li & Zhu, 2013). The findings were organised in three groups concerning the patterns of online interaction (a) 'collectively contributing/mutually supportive' which means that the group members made equal contributions to the group discussion of the

writing tasks; (b) ‘authoritative/responsive’ which means they had unequal contribution and degree of control; and (c) ‘dominant/withdrawn’ referring to having an uneven contribution and degree of control in the activity. As these interactional patterns defined the roles played by the learners, they influenced the ways the learners perceived their learning experiences in that CALL environment. The findings show that the more equally the learners contributed to achieving their goals in the activities, the more likely it seemed that they would seek and consider each other’s contribution. Also, in a similar study that used a videotaped corpus of group interaction and wiki activity logs to study wiki-based collaborative writing process of high school English as a Foreign Language learners (Lund, 2008), it was found that the collaborative nature of the activity as well as the features afforded by the Wiki (e.g., affording networked structures and shared spaces) influenced the learning outcomes. According to the study, the participants’ writing outcome improved because ‘‘in a wiki, texts are not finite or “finished” but function as resources for expansion, reconfiguration, and new syntheses’’ (Lund, 2008, p. 50). It can be concluded from these findings that it was not only the Wiki – as a technology – nor collaboration alone that enhanced the learners’ performance and outcomes, but it was all that was involved in those Wiki-based learning environments – a conclusion that adds to the understanding of the complex nature of collaboration in CALL environments, as explained earlier.

Collaboration in computer–based language learning activities has been discussed in the literature as occurring at two levels. It has been argued that collaboration begins at the individual learner level as the individual learner approaches the topic and task requirements autonomously, and then collaboration becomes collective as learners jointly in a group construct new information in a synchronous, interdependent way (Lund, 2008; Yim & Warschauer, 2017). From this perspective, the transition from individual to collective collaboration facilitates the construction of new knowledge. This aligns with Wells’ (2000) argument that knowledge building is characterised by: (1) being an intrinsic part of ‘doing something’, (2) being created between people, and (3) occurring in the participants’ collaborative meaning making

discourse. As Wells (2000) argues, what is important to understand about knowledge building is not whether the participants are working alone or with other co-participants, but the project on which they are working should be one that is shared with others and not kept to one's own self. These arguments and findings informed the decision in the present study to investigate the emergence of language use instances in the collaborative CALL environment in relation to the goals that the learners were trying to achieve in the CALL activities.

Research on collaborative learning activities has also indicated that the way in which collaborative activities within the CALL environment progress depends on the learners' goal-based collaboration. In a survey-based study, it was found that the extent to which a learning environment is goal-oriented, comfortable and interactive determines how successful it can become (Sánchez & García, 2016). Similarly, in a study that explored the influence of the task type on learners' production of articles and question forms in text-based SCMC environments, it was found that when SCMCs were more of a closed-type nature tasks (i.e., with convergent goals and only one possible outcome), they generated more opportunities for negotiation (Kim, 2017) which was one of the factors that enhanced the accuracy of their outcomes. Additionally, as discussed earlier in Section 2.2.6, previous studies have linked goal-oriented learning activities with a successful reading process (Horner & Shwery, 2002), being proactive (Bandura, 2006) and self-regulated (Duff, 2012). As Bereiter (1994) argues, a successful collaborative learning environment in which discourse is progressive is characterised by having a common understanding between the participants and by being framed and led by questions, propositions and constructive criticism. A learning environment with these characteristics is argued to be an environment that stimulates and extends students' thinking and fosters higher forms of learning and understanding (Alexander, 2008; Warschauer, 1997). It was understood from these studies that collaboration and language emergence might be linked to the learners' common understanding of the CALL activity's goals might be related.

2.3. Summary

To summarise, the literature on collaborative CALL environments presented in this chapter indicates a shift in focus from the technology used in CALL activities to CALL as a language development environment. Recent CALL research has shown that language development in a CALL environment is influenced by elements that are observable and by other elements that are not as observable but important. For instance, the literature presented in this chapter includes arguments that link language development in CALL activities to autonomy, salience, multimodality and learning strategies. This chapter also shows that recent CALL research emphasises the role of multimodality in affording opportunities for language development. In short, the research literature indicates that learning environments that have the capacity to provide variable interaction and language use opportunities have the potential to foster language development.

According to the CALL literature presented in this chapter, there appears to be a lack of studies that explore how the observable and less-observable elements of meaning making interact in real time and how that interaction influences language emergence. Similarly, while CALL research on multimodality has emphasised the role of the points of entry in meaning construction, it has not addressed how learners select an entry point and how that particular selection might relate to the emergence of language-use instances. This chapter has also shown that in the CALL literature, the features of the technological applications receive more emphasis than the ways in which learners relate to the application in order to achieve a goal. The CALL literature that explores the ways in which learners attend to specific cues and how this attention relates to the emergence of language use instances is scarce. This indicates that there is a lack of empirical studies that explore the complex interaction between technology and the other components in the CALL environment and the ways in which that interaction influences language emergence.

In the recent CALL literature, the ecological approach has been presented as a useful approach to address the complexities in the way the components of the collaborative CALL environment interact and the ways in which this interaction might relate to language emergence. To account for the complexity of interaction in collaborative CALL environments, it was decided in the current study to examine collaboration as a process of interaction that might take any possible direction between learner(s), tutor, and the computer. Additionally, the literature presented in this chapter concerning the roles of the computer, learners, teacher, and materials in the collaborative CALL environment informed the decision in the current study to include these components as integral parts of the ecology of the collaborative CALL environments.

The arguments concerning multimodality in CALL formed the basis for the understanding in the current study about the importance of accounting for the role of multimodality in collaborative CALL environments in order to develop an understanding of how language use emerges in the collaborative CALL environment. Hence, it was decided in the current study to examine how the learners' selection of entry points relates to language emergence based on the ways in which learners relate to the cues from the collaborative CALL environment as well as the features of these cues. To address how observable and less-observable elements of meaning making interact in real time and how that interaction influences language emergence, I chose to explore the process of language emergence in collaborative CALL environments using the theoretical concept of affordances. Affordances has been adopted for this study because it has been presented as a useful concept to explore the ways in which the observable and less observable elements in a learning environment relate to each other resulting in actions, such as language use instances. Also, the literature presented in this chapter informed the understanding governing this study that collaborative CALL environments, unlike most studied CALL environments (e.g., CMC, Wikispaces, and virtual contexts), has the potential to promote language emergence. Within CT, it has been argued that the more different linguistic

forms are available for learners to use, the more likely language emergence is to take place. This is the reason why this study adopts the perspectives of CT and NH in exploring the relationship between all the components in the collaborative CALL environment and how that relationship influences language emergence.

Chapter Three: Theoretical Framework

3.1. Introduction

This study was guided by two key and complementary theoretical perspectives: CT and NH. CT views language as a complex system that develops through a process of non-linear and non-static emergence "whereby novel macrolevel patterns arise from the microlevel interaction and self-organization of the multiple components" (Larsen-Freeman, 2013a, p. 24). The study is also underpinned by NH, within which it is argued that noticing is what stimulates the language processes of emergence to be integrated and formed into the learner's linguistic mental representations (Schmidt, 1990; 2001).

As a theory that addresses the relationship between language development and language use in a way that accounts for variations within and among individuals and contexts of language use, CT was chosen as the primary component of the theoretical framework to study how authentic language use emerges in collaborative CALL environments. NH, as a complementary theoretical principle in this study, guided the interpretation of the role of attention in the process of language emergence. By combining these two theoretical perspectives, it was the aim in this study to explore how language learners relate to a component or a particular language form within the collaborative CALL environment and how this process relates to the emergence of authentic language use instances.

As a theoretical concept that emphasises the role of the learner in constructing learning opportunities in a way that involves language use, perception and action, the theoretical concept of affordances has been incorporated into this study's theoretical framework. According to the concept of affordances, a language-related environment is viewed as a dynamic setting in which the learner is an active participant who interacts with other participants so as to notice and respond to stimuli (Thoms, 2014). In this

study, the concept of affordances not only supported the theoretical framework of this study but also served as an analytical tool that helped to investigate the emergence of language use instances in the collaborative CALL environment. In the following two sections, CT will be introduced and will be combined with NH as the chosen theoretical framework within which this investigation has been framed. The fourth section of this chapter (Section 3.4) introduces the concept of affordances and shows how it functions as a supportive theoretical concept in this study.

3.2. Complexity Theory

This section focuses on the principles and characteristics of CT and on how and why they are relevant to the investigation in this study and the issues being explored. Specifically, this section presents how CT has informed this study concerning context, language emergence, language variability, language use and iteration.

3.2.1. Context

Within a CT framework, context is the here and now of behaviour, and it is context that makes the global order of the (language) system (Thelen & Smith, 1994). A global order of language system is argued to be "a history of perceiving and acting in specific contexts … it is through repeated here-and-now experiences that the global order is developed (ibid., p. 216). This study is underpinned by an understanding of the global order of the language development system as a context dependent phenomenon. Informed by this position on the role of context, this study investigated language emergence in collaborative CALL environments through exploring the ways in which the here-and-now context of the collaborative CALL activities related to how the learners interacted with each other, with the computer and with the other components of the collaborative CALL environment.

According to CT, language use within a learning environment not only

depends on context, but also influences it (Larsen-Freeman & Cameron, 2008). In studies of complex systems, it has been argued that there is a continuous coupling between the organism (the learner) and its environment (van Geert, 2008). This argument is supported by the position that language development is embodied - it occurs both inside the head of the learner and in the world in which the learner is actively involved (Cowart, 2004; Lan, Chen, Li & Grant, 2015). This is a principle based on which I developed the understanding that to investigate the language behaviour in collaborative CALL environment, the temporal as well as spatial contexts need to be explored as being integral part of the CALL environment. That is, when studying language emergence (in a collaborative CALL environment) as a dynamic system, context is significant because it is believed to have an influence on the creation of the global order of the learner's language (Thelen & Smith, 1994). It follows from these arguments and theoretical positions that the here and now context is significant for CALL studies that explore how collaboration and interaction relate to the emergence of language use instances within the collaborative CALL environment.

It has been argued that activities that explore different contexts result in details that cause the language system to re-organise (Thelen & Smith, 1994). The concept of self-organisation has been used in the literature to explain non-linear developmental processes of dynamic systems that result over time in the emergence of patterns, skills and schemas (Dörnyei, 2009). This concept relates to CT as it explains what causes language patterns - or attractors in CT terms - to appear (Larsen-Freeman & Cameron, 2008; Thelen & Smith, 1994; van Geert, 2007). In line with this argument, within CT it is believed that linguistic patterns "are not pre-ordained by God, by genes, by school curriculum, or by other human policy, but instead they are emergent from the interactions of the agents involved," (Ellis, 2011, p. 3). This theoretical position emphasises the role of interaction and collaboration in language emergence within the collaborative CALL environment. Since interaction in the collaborative CALL environment occurs not only between learners but also between learners and the computer and learners and the teacher, it was decided in this study to explore the ways in which the learners

interact with the other components in the collaborative CALL environment in order to investigate how language use instances emerge.

3.2.2. Language emergence, variability and stability

Within CT, the interaction between the social as well as cognitive aspects of the learners (in the CALL environment) is argued to be what gives rise to the emergence of language patterns; “emergence is a process whereby something new, and possibly unexpected, arises from the interaction of the elements in a system” (Larsen-Freeman, 2014a, p. 665). As has been argued, the kind of ‘order’ that can emerge in a collaborative learning environment is based on the learners’ ‘mutually attuned’ and co-regulated communication (Shanker & King, 2002); in other words, “from the creation of *order* as happens when a creole develops from a pidgin” (Cameron & Larsen-Freeman, 2007, p. 232; emphasis added). Because collaborative CALL activities involve interaction between learners (inter-activity) as well as within individual learners as they relate to other components in the collaborative CALL environment (intra-activity), CT is a well-suited perspective because it argues for the significance of considering both the cognitive and the social aspects of language in studies of language development. However, according to the theory, it is not only the communication of information that results from the processes involved in a language development system as there is also a “mutual understanding [which] is something that *emerges* as … partners converge on some shared feeling, thought, action, intention, and so on” (ibid., p. 608). Adopting this argument, the emergence of language use instances in a collaborative CALL environment was investigated in relation to the ways in which learners worked collaboratively to achieve a shared goal.

From the perspective of CT, as pointed out earlier, language is studied as a dynamic system and language development as a dynamic process (de Bot, 2008b). According to this position, language learning that takes place in a learning environment, with authentic interaction and language use, is not

linear and is never fully realised (Cameron & Larsen-Freeman, 2007). Within this position, language is viewed as an ever-developing resource (de Bot et al, 2007a; Cameron & Larsen-Freeman; 2007; Larsen-Freeman, 2014b), and it does not "just reflect thought, it construes it, and with different construals, new awarenesses arise" (Larsen-Freeman, 2014b, p. 2). This position has led to the argument within CT that with every instance of authentic language use, linguistic patterns change at some level and at some timescale (Larsen-Freeman & Cameron, 2008). This is why the term 'development' in this thesis is preferred over 'acquisition' as acquisition indicates a static commodity or something to be taken in, according to Larsen-Freeman (2016a). Hence, the metaphor used to describe language learning from a CT perspective is a 'web' as opposed to a 'ladder' as in some of the traditional approaches that present language development as a linear process (Larsen-Freeman & Cameron, 2008; Larsen-Freeman, 2016b). This way of perceiving language development formed the basis for the understanding in the present study that every authentic use of language in the collaborative CALL environment marks the involvement of the learners in a process of language development, regardless of correctness of use.

As has been argued, "only when learners have access to a variety of forms are they able to select those that help them develop, so the more different forms from which they can select, the more likely development is to take place" (Verspoor et al, 2008, p. 217). Within CT, language development is perceived as being self-organising and is in a constant flux (de Bot et al, 2007a; Larsen-Freeman, 2014a; Larsen-Freeman & Cameron, 2008) within which variability is a central element and an intrinsic property (Verspoor et al, 2008). These arguments contributed to the understanding in this study that meaning making in collaborative CALL environments is a process of constant development; being based on collaboration, Collaborative CALL environments have the potential to offer a variety of language forms for learners to share and select from, as explained earlier in 2.2.8.

The notion of constant development has been contested because it implies instability in language learning, which does not reflect what happens in L1 learning. In particular, it has been challenged by studies on vocabulary or grammar learning where it was found that linguistic competence(s) of the individuals reach a steady state early in life implying that language learning reaches a static state at a particular stage of learning (Gregg, 2010). In other words, despite the many variables playing a role in first and second language development, "language development could easily lead to totally random behaviour, but it doesn't" (de Bot et al, 2007b, p. 52). Thus, it has been argued that CT has been successful in explaining the unpredictable nature of the system and the variability of the individual, but less so in explaining language universals and regularities (Dörnyei, 2009).

Yet, according to studies on CT, the theory accounts for the many observed regularities of language structure of L1 and L2. Within CT, these regularities are not perceived as rule-driven; there are no mechanisms for such top-down governance; instead, they emerge from the dynamics of language usage (Ellis & Larsen-Freeman, 2006; Larsen-Freeman & Cameron, 2008; MacWhinney, 2006). Adopting this position, this study was guided to explore language usage in collaborative CALL environments as a potential basis for language emergence, as a micro-level of language development. This position has been supported by studies of sound change over time (e.g., how Proto-Indo-European stop consonants developed into Proto-Germanic stops and other consonants, with voiceless stops changing into voiceless fricatives, etc.) and by the phenomenon of reduction and shortening of the frequently used words in language (Ellis, 2008a). Additionally, this theoretical position is further supported by what has been referred to as 'connected growers', (Cameron & Larsen-Freeman, 2007; de Bot et al, 2007a), which suggests that the growth of one aspect of language (e.g., lexical development) supports or requires the growth of another (the development of listening comprehension); which is not the same as reaching a static point of development. The unstable states in the development of grammar, for instance, reveal that "there is order in the apparent chaos," which implies reaching a stable, but not static, development (de Bot et al, 2007b, p. 52).

These arguments formed the understanding in the study that language development in collaborative CALL environments can be stable when/if collaborative CALL - as a learning environment - lacks variability, but that it is never static.

The stable state of development has been described within CT in relation to the limited and non-variable opportunities of language use; language development is fostered when learners draw from variable language-related sources in order to construct meaning. According to the theory, for the language system to grow, it has to have resources, external and internal (de Bot et al, 2007a). Language as a complex dynamic system requires internal resources like memory, time and motivation and external resources such as other learners, materials and type of environment where language is used. Based on this argument, it has been suggested that when language resources are limited, learners allocate attention to similar and non-variable categories/subsystems of language (Larsen-Freeman, 2007). This is supported by studies which found that language learners in their early stages seem to assign most of their attentional resources to vocabulary learning resulting in the so-called vocabulary burst that happens in the early stages of L1 learning. Similarly, in the early stages of language learning, it was found that the same burst occurs with aspects of grammatical development (Cameron & Larsen-Freeman, 2007). Based on these reported phenomena, it has been argued that learners begin learning grammar when equipped with at least the developmental keys of grammatical morphemes and when they have a variety of opportunities to perform in (Larsen-Freeman & Cameron, 2008). This was also the basis for the claim that language development takes place when learners are able to access a variety of forms and they are able to select those that help them develop their own language use (Thelen & Smith, 1994). For the current study, these arguments highlight the significance of accounting for what the learners already know in terms of background language or topical knowledge. It was, therefore, understood from these arguments that the external as well as internal resources available to the learners within the collaborative CALL environment may play a role in the emergence of their language use.

As has been argued within CT, the components of a language development system relate to each other in one of two ways, either compensatory (supportive) or competitive (de Bot et al, 2007a; Spoelman & Verspoor, 2010; van Geert, 2008). The compensatory relationship indicates that some variables support each other's growth, so that they grow together; i.e., 'connected growers', as discussed earlier. On the other hand, the competitive nature of the relationship between the systems' components means that the growth of one system's component depends on (or leads to) the decline of the other. An example of a compensatory relationship is found in the supportive relationship between the variables 'effort' and 'performance', but it is a competitive relationship when it comes to 'fatigue' and 'performance' (van Geert, 2008). These concepts formed the basis for this study's focus on the processes of interaction and collaboration within collaborative CALL environments. These concepts are relevant as they lend more support to the evidence that the development in complex dynamic systems is non-linear in that it displays moments of progress and regress. However, according to these concepts, regressions are believed to be temporary because the general trend of change in self-organising systems is argued to be generally upward (Verspoor et al, 2008). These concepts also align with the key theoretical principle in CT that language development depends on the degree of variability within a learning environment (Spoelman & Verspoor, 2010; Verspoor et al, 2008). In this study, the degree of variability was addressed in relation to the ways in which the learners in the collaborative CALL environment interacted and related to each other as well as to the other components in the CALL environment as they pursued a goal, i.e., the process not the outcome.

The progression and regression processes that might be observed in the collaborative CALL environments are similar to the ones seen in the U-shaped learning curve (e.g., the learning of the past tense in English, which occurs in learning both L1 and L2). While the traditional reductionist approaches propose that this phenomenon is attributed to the existence of two separate mechanisms – regular verbs rule learning and irregular verbs

rote learning (Pinker & Prince, 1994 cited in Larsen-Freeman & Cameron, 2008), within CT, it has been argued that this phenomenon happens through the operation of one single mechanism (Elman et al, 1996). That is, the regular and irregular patterns, Elman et al (1996) explain, emerge as a result of a dynamic competition between the two. Larsen-Freeman and Cameron (2008) add that in the initial stages, learners do not succeed in marking the past tense morphologically (verb + -ed) due to the high frequency of the irregular verbs in the language they are exposed to. Later, the frequency of the regular verbs overwhelms the token frequencies of the irregular forms leading to the disappearance of the irregular forms in the learners' language. This disappearance is characterised by the dip in the U-shape curve of learning, and it is in this dip where a change in the proportional strength of the regular '-ed' starts to develop leading to the reappearance of the irregular. This also accords with the evidence that linguistic patterns stabilise if they are highly frequent as high-frequency sequences become entrenched in the morphosyntactic structure leading to resistance of being restructured, (Bybee, 2006). This is to say that:

> As the number of verbs in the competition pool expands across the course of learning, there is a shift in the relative type frequency of regular and token frequencies of irregular form, a quality which is registered in the virtual adapting of language resources, and the irregular forms reappear (Larsen-Freeman & Cameron, 2008, p. 129).

It was understood from this position that whether being within a regression or progression stage of development, every authentic example of language use within the collaborative CALL environment contributes to the degree of variability of that language-related environment. This understanding is supported by research on development of language complexity in foreign language learning contexts. For instance, a longitudinal case study was conducted to investigate the writing development in Finnish learner language (Spoelman & Verspoor, 2010). The data were generated by analysing 54 writing samples focusing on the accuracy and complexity (word and sentence complexity) of the learners' linguistic performance. Adopting the

position that accuracy and complexity change and develop over time, that study focused on how learners allocate their attentional resources by prioritising one over the other. To study the interaction between accuracy and complexity, that study examined the development of case errors and the development of word complexity. The findings show that the relationship between accuracy and complexity was rather up-and-down, i.e., with positive and negative correlations. Such a degree of variability at the individual level aligns with the argument that the system stability is measured by the degree of variability around a particular language structure. The outcomes of that study also "affirm once again the assumption that a relatively more unstable period [could] be seen as a sign that the system [was] changing" (Spoelman & Verspoor, 2010, p. 550). In line with this argument, from the perspective of CT, variability at the individual level is not perceived as 'noise' but rather crucial to understand language development (Larsen-Freeman & Cameron, 2008). This is relevant to the current study as it indicates that "[a] close look at individual variability [in the collaborative CALL environment] from a CT perspective may help [to] discover developmental patterns that otherwise would remain hidden" (Verspoor et al, 2008, p. 229). Therefore, it was decided in this study to examine the ways in which variability at the learners' individual level related to the emergence of language use instances in the collaborative CALL environment.

CT, however, is not the only theoretical approach that presents language development as variable and non-linear and that emphasises authentic and novel language use. For instance, based on interactionist and sociocultural perspectives, language learning has been presented as being facilitated when learners engage in interactive and communicative activities, wherein they receive comprehensible input, construct feedback, and produce modified output in the target language (Long 1985); and that the learning environment must include opportunities for learners to engage in meaningful social interaction (Pica, 1987; 1996). Yet, unlike the interactionist perspectives, CT maintains that any interaction is a mutual one in the sense that it affects and is affected by the language resources of the participants and that the social context is not merely a site for communication but rather

an integral part that influences the interaction (Larsen-Freeman & Cameron, 2008). Similarly, unlike sociocultural theory that positions the (internal) cognitive activity in the (external) social activity (carrying out actions to realise internal biological or cultural motives under spatial and temporal conditions; as in Lantolf, 2000), CT, as noted earlier, emphasises the interconnectedness between the internal language resources of the learner and the outside social resources; namely, language development is believed to exist in the ongoing dynamic interaction between these resources (Larsen-Freeman & Cameron, 2008) and is 'mutually attuned' (Shanker & King, 2002). It would therefore seem at first glance that these alternative theoretical approaches are just as applicable. However, within CT, this study is guided to account for language use and language emergence as situated in the interaction, which is different from the interactionist perspective that distinguishes between language use and language acquisition (Larsen-Freeman, 2014b; Long, 1997).

3.2.3. Language use and iteration

One feature of the collaborative CALL environments studied here is that they involve multiple components which have the potential to interact with one another at multiple levels. It has been argued that the intrinsic interactions of a dynamic language system make up a structured network of constructions based on a conventionalised form-meaning-use combination (Ellis & Larsen-Freeman, 2006). Based on that complex interaction, language patterns emerge as a result of repeated authentic use, Ellis (2008a) argues. Furthermore, repeated form-meaning-use patterns are argued to strengthen the memory representation of constructions and, hence, develop the learner's experience in interactions with others (Ellis, 2011). The repeated form-meaning-use patterns are believed to emerge "from the collaboration of the memories of all the utterances in a learner's entire history of language use and the frequency-biased abstraction of regularities within them" (Ellis & Larsen-Freeman, 2006, p. 92). It is understood from these arguments that there is a link between language emergence, language use and aspects of language mental representations, such as memory, within activities of

repeated form-meaning-use patterns. These arguments guided the decision in this study to investigate the emergence of the learners' language use in relation to what they already know concerning that particular language use instance.

Furthermore, research on iterative language practice has shown that iterative activities have the potential to foster language development as they vary the opportunities of language use (Larsen-Freeman, 2014b). This aligns with the argument within CT, as presented earlier, that every authentic use of language results in language development (Ellis, 2008a). The iterative practice of language use has been described using the processes of 'soft assemble' of language patterns to create meaning (Larsen-Freeman, 2013b). That is, being the "make-do extemporaneous response to the communicative pressures at hand," soft assembles iterate complex systems when varied (Cameron & Larsen-Freeman, 2007, p. 9). As has been argued, each new iteration uses the elements of the previous soft-assembly but always starting at a different point, and this whole process builds up the complex system (Larsen-Freeman, 2013b). The learner's grammar, for instance, has been claimed to be an abstract cognitive category that may be seen as strongly tied to the experiences that the learner has had with language (Bybee, 2006). These arguments form the basis for the understanding in this study that a language use situation in which learners use previously known language but at a different starting point, and/or for a different communicative purpose, is what differentiates iteration from repetition. This is relevant to this study as it indicates that the emergence of language use instances within collaborative CALL environment relates to the iterative nature of the activity.

The relation between the iterative nature of a language learning activity and language emergence is discussed in CMC studies. The findings from one CMC study that explored the level of accuracy learners achieve and the attention they pay to grammar revision versus content revision supports the relationship between iteration and language emergence (Kessler, 2009). The participants in that study were asked to collaboratively construct a wiki-based

text in which they define ‘culture’, in the form of reflections on what they had learned in the course. The participants’ contribution to the wiki-based text was in the form of feedback and alterations to each other’s contribution. That is, ‘‘each alteration essentially create[d] an entirely new iteration of the text as a whole’’ (Kessler, 2009, p. 92). Although the findings of that study show that the participants overlooked grammatical issues when meaning was not impeded, the findings still indicate that the participants were engaged in discussions that reached eight layers of interaction. Every layer of interaction was considered an instance of language iteration because the learners were required to express themselves in a different way and because every interaction started at a different point building on the previous ones. A similar study that focused on learner-computer interaction during an error correction process by examining learners’ responses to metalinguistic feedback from a Web-based intelligent language tutoring system found that as iterations of error correction increased, students paid more attention to corrective feedback (Heift, 2001). Heift’s finding - that the more iterative a language learning activity is, the more effective for language development it becomes - informed the current study that the more iterative the CALL environment is, the more opportunities for language emergence there are.

The decision in this study to investigate language use in collaborative CALL environments as being part of a process of iteration highlights the relevance of exploring strings of language use instances of the collaborative interaction in the CALL environment. This understanding was informed by the argument that language development can be viewed as a process of constant adaptation of language use patterns (Larsen-Freeman, 2013b). Additionally, it has been argued that adaptive language usage leads to language development over time (Ellis, 2008a). This indicates that language learning, as Dörnyei (2009) claims, becomes a process of gradual ‘finetuning’ of adjustments because a language system (a) is made capable of self-programming (soft-assembly), (b) involves extracting regularities from the language input, and (c) generalises its performance to novel stimuli. Also, within the language usage theory, it is postulated that when learners experience language tokens from input, they activate responsible neurons,

especially when language tokens are reinforced and repeated (Bybee, 2008; MacWhinney, 2008). These arguments have led to the understanding in this study that every instance of authentic language use within the collaborative CALL environment illustrates an instance in the language development process of the learner.

This constant adaptation process within an iterative activity is argued to happen as a continuous process of responses to the input (or cue) in the communicative situation of a learning environment (Larsen-Freeman & Cameron, 2008). The usage-based theory supports this argument as it states that meaning is about how people use linguistic structures to achieve social goals and that structure emerges from use (Ellis, 2008a; 2011; Tomasello, 2008). These ideas and positions developed the understanding in this study concerning the iterative nature of language use within the collaborative CALL environment which is rich in opportunities for authentic language use that, as claimed within CT, has the potential to enable their language system to continually adapt and self-organise in the service of developing a more stable language structure.

Being a continuous process of responses to cues in the communicative learning environment, the concept of adaptation within CT indicates the significance of that first response in triggering such a process of language use. As this continuous process of responses relates to the function of attention, it was decided in this study to investigate what triggers the learners' responses and utterances in order to examine how attention relates to language emergence in the collaborative CALL environment. This decision was also informed by the argument that the first phase of learning a particular language feature may be the activation of the responsible neurons by tokens of language in the input and/or in the language use (Bybee, 2008; MacWhinney, 2008). Here is where CT aligns with NH, and in this way, they complement each other to form the theoretical framework of the current study. The following section presents some of the theoretical principles within

NH and how they contributed to understanding the research issues in this study.

3.3. Noticing Hypothesis

Since it was introduced more than two decades ago, NH has appeared as a theory that brought previous hypotheses together, particularly the interaction hypothesis (Long, 1985), the input hypothesis (Krashen, 1985) and the output hypothesis (Swain, 1985). According to NH, for language development in collaborative CALL environments to take place, input has to be first noticed by the learner and become intake, i.e., consciously registered (Schmidt, 1990). Informed by this argument, NH was chosen for this study as a well suited theoretical perspective to explore the attentional processes of the individual learner in the collaborative CALL environment.

However, it has been recognised by scholars adopting NH that the concept of noticing does not account for the levels of detection and attention within the process of noticing. That is, it has been claimed that if elements of input in a learning environment (e.g., a particular language feature) are to be attended to for learning to take place, there must be aspects or features that facilitate detecting elements in the input (Tomlin & Villa, 1994). Consequently, NH has been reformulated (in Schmidt, 2001) by describing 'noticing' as a separate mechanism from 'metalinguistic awareness' based on the argument that what is attended to and noticed "are elements of the surface structure of utterances in the input – features of language, rather than any abstract rules or principles of which such features may be exemplars" (2001, p. 5). In this formulated version, attention and awareness are regarded as two sides of the same mechanism (Schmidt, 2001). It has also been claimed that attention and awareness are almost impossible to separate and that noticing is the subjective correlate of attention, according to Schmidt (2001). The current study adopts the position that noticing is the 'conscious registration' of language forms which is a higher level of 'understanding', while attention is a complex concept that involves

interrelated levels of attentional mechanisms as discussed in more detail in the following sections.

3.3.1. Noticing

In this thesis, noticing is defined as the process of consciously registering and/or understanding a linguistic stimulus after it has been unconsciously detected. Defined this way, noticing captures the meaning of both metaphors discussed later in 3.3.3, a 'gate' (Schmidt's NH, 2001) through which input becomes intake and a 'push' (Larsen-Freeman & Cameron's view on CT, 2008) which is necessary for crossing a threshold by learning or relearning something new. Because the emergence of authentic language use is the focus of this study, noticing is discussed from the perspective of the learner. Given this focus, the following paragraphs discuss how the process of language emergence is viewed within NH. Investigating how and why learners may or may not notice a particular stimulus in the communicative input of the collaborative CALL environment could shed light on what influences salience within the collaborative CALL environments.

Noticing, as Schmidt (2001) argues, is the first step in language development, not the end of the process. This argument shaped the understanding in the study that to investigate the emergence of language use, it is necessary to examine the ways in which learners initiate the process of language emergence in the collaborative CALL environment, i.e., their initial states of language emergence as in CT. However, the concept of noticing and its role in language development has been criticised at different levels. First, it has been challenged conceptually as it has been claimed that noticing occurs to the stimuli that exist in input which itself is objective–out in the environment (Carroll, 2006). This challenges the role of noticing (being a mental function itself) in influencing the construction of the mental representations and exemplars (e.g., phonemes, syllables, morphemes, nouns and verbs.) which are all in the mind (Carroll, 2006; Truscott, 1998). Another area of criticism is regarding the conscious levels of noticing. That is,

it has been claimed that the process of noticing language features ‘‘presupposes some degree of understanding of the form’’, which might reflect levels of consciousness as well as unconsciousness (Truscott & Sharwood, 2011, p. 503). Furthermore, there are studies that argue for the possibility of learning without awareness at the level of understanding (e.g., Williams, 2013), that noticing is a deeper form of learning than conscious attention (e.g., Koch & Tsuchiya, 2007), and that learning non-rule-based knowledge is unconscious (Scott & Dienes, 2010). Informed by the arguments in these studies and as the aim of the current study is to investigate language emergence in collaborative CALL environments, the concept of noticing, regardless of the level of consciousness involved, is perceived as a facilitative element of language emergence.

Previous studies have found that noticing is facilitative, if not necessary, for language development. For instance, in a study that defined noticing as a ‘‘form of subjective awareness of new targeted linguistic forms’’, noticing was operationalised as making a verbal or written correction of the targeted form (e.g., self-correction) and/or as commenting on the targeted linguistic forms (the use of expressions such as “mmm, I see’’) (Leow, 1997, p. 474). Data were generated using think-aloud protocols produced by the participants (28 beginner students of Spanish as an L2) while completing a problem-solving task. It was found that the learners who demonstrated higher levels of awareness performed significantly better on the problem-solving activities and they also performed more accurately. This finding shows a link between ‘conscious attention’ (i.e., noticing) and better performance on language learning tasks. Similarly, links were also identified between learners’ ‘high sensitivity’ to exemplars of the target structure in subsequent input and better performance on tests, as in Mackey (2006). These findings align with the argument within NH that more noticing leads to more learning (Schmidt, 2001). Since the current study investigates what facilitates language emergence in collaborative CALL environments, exploring the ways in which the learners attend to language-related features in the collaborative CALL environment was deemed useful because, according to NH, such ways relate to the emergence of authentic language use.

3.3.2. Attention

The position that attention is a conscious mental mechanism was supported by the framework that was identified through a study that sought to establish a minimum set of the cognitive operations required for the development and use of language (Bialystok, 1994). The basis of that framework was that mental representations evolve and organise into self-organising maps (Bialystok, 1994). Drawing on this idea, Bialystok proposed a framework that included two components, which she named 'analysis' and 'control'. As analysis refers to the process of arrangement and rearrangements of mental representations, it was argued that in the process of analysis, unanalysed representations (e.g., some formulaic chunks that are important for oral purposes) gradually change into more analysed representations which are required to support higher literacy skills (ibid.). In other words, the change from unanalysed to analysed is argued to be what makes implicit knowledge become explicit, which indicates that explicitness is about the level of organisation in the mental representation. Control, on the other hand, refers to the process of selective attention to access to those (analysed) representations in real time, and according to Bialystok this is the basis of fluency. It follows from this argument that choosing to focus attention on what forms internal representations gives rise to the construct of awareness and to becoming conscious (Schmidt, 2001). For the current study, it was understood from these arguments that selective attention is a conscious mechanism that leads to awareness. It is this meaning and role of attention that this research adopts as it signifies the relation between the ways in which the learners attend to cues in the collaborative CALL environment and the process of language emergence.

Yet, one of the earliest criticisms of NH is that attention to form and attention to meaning are two different processes and that one comes before the other (e.g., VanPatten, 1990; White, Spada, Lightbown, & Ranta, 1991). Therefore, in the current study guided by CT which is a relational theory, it was accepted that attention should not be regarded as a single mechanism

(whether that is to meaning or to form) but rather as interrelated subsystems. These subsystems are argued to consist of three functions: alertness, orientation and detection (Tomlin & Villa, 1994). To clarify the role noticing may play in language emergence within collaborative CALL environments, the following sections elaborate on the attentional functions of alertness, orientation and detection.

3.3.2.1. Alertness and orientation

In this thesis, orientation is described as the process of committing attentional resources to sensory stimuli (as in Schmidt, 2001; Tomlin & Villa, 1994), which is modulated by the alertness attentional subsystem since alertness "maintains a state of vigilance to increase the rate at which high priority information is detected" (Schmidt, 2001, p. 17). This view of the relationship between alertness and orientation indicates that both mechanisms depend on the way the learners relate to the sensory stimuli that exist in the environment. This way of viewing how alertness relates to orientation contributed to the understanding in this study that the starting point of processing information in collaborative CALL environment could be explored by investigating how such point of access, discussed earlier in 2.2.5, relates to the ways in which learners commit their sensory stimuli within the collaborative CALL environment.

As alertness is about the overall readiness to receive and process incoming stimuli and eventually to modulate the attentional mechanism of orientation (Tomlin & Villa, 1994), it was used elsewhere as the theoretical basis to develop some language instructional techniques like 'input-flooding' (containing high frequencies of the targeted language) and 'input enhancement' (graphologically highlighting targeted structure). Previous studies on the effect of these instructional techniques on language development have shown a link between these techniques and language development. For instance, a study was conducted to examine the effect of orientation in the form of input enhancement (Jourdenais et al cited in Ellis,

2003). That study investigated whether learners would use the past tense forms when presented with enhanced input more than the learners who just worked on unenhanced texts. It was found that learners who were exposed to enhanced input used the targeted structure more than those who were not. As the use of the target language could be an indicator of a successful committing of attentional resources to the target language, it was understood in this study that orientation and alertness could help to investigate the process of language emergence in the collaborative CALL environment.

Orientation is also related to the notion of focus-on-form, which is concerned about pedagogical efforts (or interventions) to draw learners' attention to language either explicitly or implicitly (Doughty, 2001; Long & Robinson, 1998; Robinson, 2003). It has been argued that in the approach of focus-on-form, learners are involved simultaneously in joint processing of meaning, form and use (Doughty, 2001). According to this argument, once the learner commits his/her attentional resources to a stimulus in the collaborative CALL environment, s/he analyses that particular linguistic information to be ready for further processing. This process is believed to be preceded by being motivated, interested and ready to learn (i.e., alert). Then both alertness and orientation facilitate the registration of the perceived stimulus in the learning environment, and eventually this process results in modulating the third attentional function, i.e., detection. This argument not only interfaces with the arguments discussed earlier that the processing of input is nonlinear and developmental, but it also supports the understanding that language development in collaborative CALL environments could be achieved by exploring the ways in which learners attend to the target language, be it form or meaning. This is also relevant to the present investigation as it illustrates how interconnected the components of the collaborative CALL environments are and that it is through this interconnectedness that the process of language emergence in the collaborative CALL environment can be investigated.

3.3.2.2. Detection

In language-related environments, detection is considered to be the most crucial attentional mechanism for language learning. This is because detection is claimed to be the point at which linguistic information becomes available for further processing (Posner & Petersen, 1990; Schmidt, 2001; 2010; Tomlin & Villa, 1994). Tomlin and Villa (1994) argue that detection is separate from awareness because awareness requires the individual to (1) show a change in behaviour, (2) explicitly report being aware of what has been detected and (3) describe the subjective experience. Based on this argument, it was understood in this study that attention could be separate from awareness as none of these three criteria is met by the attentional function of detection. This argument supports the idea discussed earlier in Section 3.3.2.1 that it is possible for information to be cognitively detected without the awareness of the individual. Unlike alertness and orientation, detection may or may not require a level of awareness. Studies on semantic priming have provided evidence for this view. For example, in an experimental study, it was found that the word *nurse* was read more rapidly when it followed the word *doctor* than when it followed some semantically unrelated (or less related) words such as *proctor* (Tomlin & Villa; 1994).

However, the phenomenon of the semantic priming highlights an issue as to whether the phenomenon is learning or only perception. Within CT, learning is believed to be non-subliminal; therefore, what happened in that semantic priming study was understood to be possible only if the semantic primes have been already established as mental representations, Schmidt (2001) argues. This argument is supported by an experiment that was conducted to examine form-meaning connections and in which the participants attended and noticed the relevant forms (determiners) but did not attend to contingencies (animate or inanimate head nouns) (Williams, 2005). During the experiment, some participants were trained and hence became aware of contingencies but others seemed to be completely unaware. Those who showed signs of awareness performed nearly perfectly on a post-test and the others did not do as well, but they still showed some knowledge of animate and inanimate head nouns. While the main finding of that study was that "implicit learning of form-meaning connections is possible" (Williams, 2005, p.

298), what supports the argument that detection may be associated with awareness is that implicit learning seemed to correlate with the prior knowledge of those participants who succeeded in making the distinction, as indicated by that study.

That understanding of the relationship between prior knowledge, detection and awareness has led to the argument that detection has two levels, one with awareness and another without (as in Schmidt, 2001; 2010). Detection without awareness was understood as being within the implicit learning (unconscious registration) and detection with awareness (a higher level of awareness) was labelled noticing (ibid.). Noticing, as discussed earlier in Section 3.3.2.1, was described as the point at which linguistic information becomes available for further processing (Posner & Petersen, 1990). This is the description of noticing that this study adopts as it describes noticing as a distinct mechanism but at the same time intertwined with the other attentional mechanisms (alertness and orientation), each one modulating the other. To maintain the interconnectedness of these attentional mechanisms, it was decided in this study to investigate the emergence of authentic language use in a way that accounts for the effects of the internal factors (learners' cognitive processes) as well as the external ones (e.g., other learners, Web-based materials, teacher).

3.3.3. Noticing Hypothesis and Complexity Theory

While CT is useful to study language behaviour in collaborative CALL environments, NH has the potential to provide insight into what goes on in the mind of the individual learner within the CALL environment. The most basic and fundamental similarity between these two theoretical approaches is manifested in the primary claim of NH; that is, consciousness at the level of noticing is essential for language development (Schmidt, 1990; 2001). Also, the view of language development within CT as a system that consists of continuous and dynamic processes in which internal and external factors are involved echoes a similar idea that Schmidt (2001) proposes about

attention in language learning. According to NH, noticing is what makes the language input in collaborative CALL environments become intake (consciously registered), and attention aids that input to become available for further mental processing (Schmidt, 1990; 2001; White, 1998). Therefore, the metaphor used in this account is 'gate' (as in Schmidt, 2001), which is informative for the current study because it illustrates the role of noticing in language development. This metaphor matches in CT the metaphor of the 'push' which is argued to be required in order to send the learner's language out of a stable state (as in Larsen-Freeman & Cameron, 2008), which eventually results in a change to the language system. This shows that both approaches represent a process that requires external as well as internal influences, so that a change can take place in the language system. In response to this possible change, as has been argued, the language system self-organises, leading to the emergence of a complex system (Larsen-Freeman & Cameron, 2008) - a new state of language which could be within either the category of progression or regression as discussed earlier in 3.2.2.

Moreover, the way in which the phenomenon of language fossilisation is viewed within CT and NH supports the understanding in this study that they are complementary to each other. Within NH, it is claimed that one reason behind the phenomenon of fossilisation is the inability to notice a particular form especially when it is of low salience. Similarly, within the perspective of CT, fossilisation is described as a state where linguistic structure is stable. For example, not being able to use the third singular –s might mean that the learner has failed to attend to its use and now the third singular –s is in a stable state of development. The more the learner misses noticing it, the more stable that state becomes, but once the learner starts to notice it and/or it starts to appear in his/her language production, it is being pushed out of that state (the attractor). According to these views on language fossilisation, both perspectives appear to support the idea that linguistic knowledge is organised into a series of self-organising mental maps. For learning to take place, it has been argued that the units, or neurons, that make up these maps have to be activated by a stimulus in the input (Bybee, 2008; MacWhinney, 2008). It is believed that through more language learning

reinforcement (e.g., frequency and/or repetition), the responding units undergo adjustments to increase the strength and precision of the activation, which also makes the neighbouring units more responsive to similar input in the future (ibid.). Ellis (2008b) refers to the perceived strength of the input stimuli as 'salience', a key term in the current study discussed earlier in Section 2.2.2, which also shows another language learning area that these perspectives account for similarly.

There are also other relevant areas where NH aligns with CT forming a basis to investigate language emergence in an environment like collaborative CALL. For instance, both take into account the limited nature of the language resources available for the learners in a learning environment like collaborative CALL. Variability and change, as central notions within CT, are explained based on the limited, subjective, and selective nature of the learner's resources (e.g., working memory). When there is a change in the resources available to the learner, the state of the language system is argued to change too (Larsen-Freeman & Cameron, 2008). Similarly, the whole theory of noticing is based on the concept of attention, and attention is selective and limited on its own. The combination of these two theoretical perspectives has contributed to forming a suitable theoretical basis in this study to investigate how the internal as well as external language resources of the learners within the collaborative CALL environment related to the emergence of their language use.

One more important commonality shared by these two theoretical approaches is evident in the resemblance between their views on the U-shaped learning curve and the vocabulary burst phenomenon in early stages of language development. As discussed previously in 3.2.2, within CT, it is claimed that the U-shape learning is a result of a dynamic competition between regular and irregular verbs (Ellis & Larsen-Freeman, 2006; Larsen-Freeman & Cameron, 2008). This view accords with the claim within NH that the first stage of L2 input processing is the competition between ideas to access consciousness (Gass, 1997; Schmidt, 2001). Additionally, both CT

and NH argue that when learners process language input, they tend to direct their attentional resources to the elements that carry message meaning (i.e., lexicon) and then to the formal features (MacWhinney, 2008; Schmidt, 2001; VanPatten, 1990). Finally, within CT, it has been argued that language development happens when/if a certain critical threshold in the learners' language system is crossed. This phenomenon has been referred to as 'phase shift' in which language development in the form of change may occur (Larsen-Freeman & Cameron; 2008). The relevance of this phenomenon to this investigation is that a phase shift ''signals a restructuring'' of the learners' language (Larsen-Freeman, 2011, p. 78) and ''instability in the system [which] can direct our attention to the conditions that lead up to them'' (ibid., p. 80). Noticing, viewed as the mechanism responsible for making the language input become intake, appears to be what is needed for such a phase shift to take place; namely, the threshold in the learners' language system to be crossed. This shows that both views highlight a similar role of noticing in language development. Therefore, these two theoretical perspectives have been chosen to form a sound basis in this study to examine how the emergence of authentic language use relates to noticing in the collaborative CALL environment.

3.4. Affordances

The concept of affordances is useful for this study as both a tool of analysis and as mediating part of the conceptual framework. It was used in this study to strengthen the link between the two concepts of CT and NH. The following two sections provide an account of how the concept of affordances was used in this study and why.

3.4.1. Affordances in collaborative CALL environments

The concept of affordances has been described in the literature in different ways. In what is considered to be one of the earliest definitions, the concept was described as what the environment offers the agent either for good or ill

(Gibson, 1979). While that early definition emphasises the 'offering' of the environment, in recent definitions of the concept, emphasis has been shifted to be on the ways in which the agents respond to the 'offering' of the environment (Scarantino, 2003) and on the relational possibilities of action in order to achieve certain goals (van Lier, 2004). Described in this latter way, affordances are argued to be constructed by the learner when s/he is active and engaged in the learning environment (Ahn, 2016; van Lier, 2004). These views broaden the early description of affordances as they view the concept as not only what the environment offers (as in Gibson, 1979); rather, it could be what the learners construct by being active and involved in their environment. This is the view of affordances that was adopted in this study because it incorporates the external as well as internal resources available for the learner, which have been emphasised by CT and NH as significant factors in language development.

The previous views and descriptions of the concept of affordances can be understood in a way that the concept is seen as 'opportunities of action' and at the same time 'opportunities being enacted' by the agent to achieve goals (as in Thoms, 2014 and van Lier, 2004). Because the present study investigates the emergence of authentic language use within the collaborative CALL environment, not the possibilities of language emergence, affordances within collaborative CALL environments were viewed as opportunities being enacted by an agent in order to achieve a gaol. That is, in this study it was understood that language use affordances were constructed based on the ways in which learners related to and enacted the cues available in the CALL environment in order to achieve their goals in the collaborative CALL activities, and thus fuels perception and brings about further action, a view that incorporates Scarantino (2003), van Lier (2004), Peng (2011) and Thoms (2014).

The view of affordances as possibilities being enacted within an environment illustrates four elements involved in the construction of affordances in the collaborative CALL environments: (1) *perception* of cues by (2) *learners*,

leading to a further (3) *action* in order to achieve (4) a *goal*. It has been argued that affordances are constructed based on the complementarity between these elements (Collentine, 2011; Collentine & Collentine, 2015; Russell, 2012). This complementary and reciprocal relation (as in Gibson, 1979) is believed to facilitate the enactment of language development affordances (Burlamaqui & Dong, 2015; Peng, 2011; van Lier, 2004). These elements also indicate that the learner is both the agent who constructs meaning from a learning opportunity and is also part of that learning opportunity. This is consistent with the ecological approach of the current study. In other words, by being active in the collaborative CALL environment, the learner constructs affordances of language use; and in the process of constructing affordances, s/he constructs and communicates meaning. This understanding of how the construction of language use affordances relates to the ecological approach informed the understanding in the present study in that investigating the language emergence process could be achieved by exploring the ways in which learners interact and are involved in order to accomplish their goals in the collaborative CALL activities.

Affordances are argued to be operationalised through cycles of perception and action (Thoms, 2014; Young, Barab, & Garrett, 2000; Zheng, Young, Wagner & Brewer, 2009). In a study that investigated the use of strategies for reading computer-based texts at home and school, a number of reading strategies were identified that reflected a similar cycle of perception and action (Park & Kim, 2016). In that study, teachers encouraged the learners to read different types of computer-based texts based on the goals of the classes. The participants verbally reported what they thought and did while reading. It was found that active learners made critical decisions about which texts to read and what information to choose. Those decisions were taken after setting up a purpose for reading (e.g., finding information about the moon), which was followed by reviews and evaluations of the texts. In that study, it was also found that the process of reviewing those texts involved predictions based on textual cues such as a word in the title. Also, it was found in that study that the learners previewed texts to check relevance to their specific needs or interests, and based on that, they decided whether to

read those texts or not. For the current study, it was understood from those findings that as a language-related activity, reading computer-based texts involves processes of perceiving textual cues that inform or lead to actions (e.g., deciding what to read, what is relevant and what information to choose). This cycle of perception and action is a process that is argued to be a situation that can afford opportunities for language development (van Lier, 2000; 2004). This view of affordances as cycles of perception and action informed the decision in the current study to examine the ways in which learners perceive cues from the environment and the ways in which such perception relates to their actions and interactions.

3.4.2. Affordances, Complexity Theory and Noticing Hypothesis

Both affordances and CT present language development as an emergent phenomenon that involves the interaction of multiple components. As noted earlier, the collaborative CALL environment consists of learners, a teacher, tools (e.g., the computer and worksheets) and a language activity the learners are working on. Beside their use of technology, learners in a collaborative computer-based language learning environment are involved in various forms of interaction, e.g., between the learner(s) and the computer and between a learner and other learners in that environment. These are believed to form the individual and the social aspects of such learning environments (Heift & Chapelle, 2011). Within affordances and CT, language development is presented as being inter- as well as intra-personal (Larsen-Freeman & Cameron, 2008). From an ecological perspective, language is seen as “a system of relations rather than a collection of objects” (van Lier, 2004, p. 5), which not only shows that affordances, which involves processes of perception and action, aligns with CT, which adopts the view of language as being constructed both in the mind and in the world, but also indicates that language development can be explained in terms of dynamic cognitive processes as well as of social relations (Thoms, 2014; van Lier, 2000). This shows that both affordances and CT emphasise the dynamic and emergent nature of language development, and that language development is situated in context (Aronin & Singleton, 2012; Lafford, 2009). Guided by both

perspectives, it was decided in the current study to investigate language emergence as a phenomenon that ‘‘emerges from the moment’’ and it cannot be analysed ‘‘separately [from] the different variables that underlie [that] moment’’ (Thoms, 2014, p. 726). Moreover, the concept of affordances emphasises the individual differences among learners (variability in CT) as a factor that is essential to be recognised and taken into account in order to understand language development, Lafford (2009) argues. Both affordances and CT formed the basis for the decision in this study to investigate language emergence in collaborative CALL environments through examining the features of individual elements of the collaborative CALL environment as well as how the individual elements related to each other.

The concept of Affordances also aligns with NH in relation to the concept of noticing as both emphasise the role of attention in language development. Noticing and affordances are both presented as concepts that ‘‘crucially [hinge] upon [the] perceivability’’ in a learning environment (Scarantino, 2003, p. 954). Since affordances are described as the action that takes place when cues invite learners to act upon (as in Burlamaqui & Dong, 2015), it can be understood that language use affordances become available as soon as the learner recognises them (van Lier, 2004). In a study that sought to find out the types of linguistic affordances that emerge in bilingual telecollaborative chat sessions and how learners respond to learning opportunities, it was found that noticing played a facilitative role (Darhower, 2008). In that study, the cycles of feedback and negotiation of meaning were described as affordances. Similar cycles were studied in telecollaborative chatrooms (with Spanish learners of English and English learners of Spanish). The focus of that study was on feedback that might motivate learners to ‘notice the gap’ (after Schmidt, 1990). That study identified a number of language learning opportunities that involved checking comprehension, indicating non-comprehension, and requesting confirmation of meaning. From previous work (e.g., Schmidt, 1990; Pica, 1996), these can be seen as strategies that enable learners to notice certain linguistic forms, and hence construct affordances. While these findings support previous arguments about the role of the learner’s agency in supporting language development (as in van Lier,

2004), they also indicate that the construction of affordances takes place when learners consciously become aware of them. Recognising a cue and responding to it with an action (i.e., affordances) indicates that there is a level of consciousness (i.e., noticing) in the process of constructing affordances.

To sum up, the concept of affordances relates to the conceptual framework in the present study not only because it shares similar principles with CT and NH, but also because it guided my understanding of how learners act and perform in the collaborative CALL environment, i.e., how the learners operationalise opportunities of language use. The use of affordances in the present study helped to explicitly recognise technology and language as elements for analysis in the collaborative CALL environment, as in Hubbard and Levy (2016). That is, the theoretical concept of affordances, being part of the conceptual framework of the present study, contributed to forming the basis for my decision to explore the role of collaboration in collaborative CALL environments because the concept emphasises that:

> language learning is not an isolated activity within the implicit causality of input and output but a dynamic process that mandates that the learner be an active participant in the language learning environment and that he/she interact with other participants so as to notice and make use of the affordances in a particular setting (Thoms, 2014, p. 727).

On this basis, it was decided in this study to explore the ways in which affordances of authentic language use were constructed in the collaborative CALL environments in order to develop an understanding of both language emergence as the phenomenon investigated in this study and the conceptual components this study is framed within.

3.5. Summary

This chapter presented CT, NH and affordances as the components of the theoretical framework that underpinned my understanding of key issues

within the study. The theoretical principles within CT have shaped the understanding in this study regarding the role of authentic language use in language learning. As a theory that presents language development as resulting from the mutual and reciprocal interaction between the social as well as cognitive aspects of the learners, it was accepted in the current study that language is an ever-developing resource and that every authentic and novel language use contributes towards language development. Also, the principle within CT that every authentic language use makes up a structured network of language constructions contributed to the understanding in this study that within every language use there is a process that is common to language emergence. This understanding informed the decision in this study to investigate the ways in which the learners' language use relates to the other components within the collaborative CALL environment in order to develop an understanding of what promotes or demotes language emergence.

NH being a theory within which it is argued that noticing is the first step in language development formed the basis for this study's decision to explore the ways in which learners attend to cues in the collaborative CALL environment and how that attention relates to their language use. This aspect of exploring attention is where the concept of affordances in this study fits as it is a theoretical concept that is concerned with how perception relates to action and achieving goals within an environment. The concept of affordances has been presented here as a conceptual approach that contributed to the understanding in the current study that language development can be explored through examining the ways in which learners related to cues from the collaborative CALL environment.

These three perspectives provided a comprehensive framework to study the phenomenon of language emergence in collaborative CALL environments in a way that gives account to bottom-up processes, e.g., from the perception of cues and how that influences their collaborative performance and eventually their language use; as well as to top-down processes, e.g., how the macro-

context of the classrooms and micro-context of the groups of learners within them influence what the learners attend to and how that leads to particular language use, action and interaction.

Chapter Four: Methodology

4.1. Introduction

This chapter presents the research paradigm and methodological approach within which data for this study were collected and analysed. It explains the rationale for the choice of qualitative enquiry as the research design to study how authentic language use emerges in collaborative CALL environments. Language emergence in this study, as discussed earlier in Chapter One and Chapter Three, is used to refer to the micro-level of language development, which involves any authentic use of language as a response to or an enactment of a situation in collaborative CALL environments. This chapter begins by introducing the research paradigm and approach that guided this investigation. It also explains why and how video stimulated recall interviews were used as the primary instrument for data collection. This chapter ends by explaining how ethical issues were addressed and provides an account of my positionality in relation to the processes of data collection and analysis.

4.2. Ontological and epistemological paradigm

Ontologically, the position I have adopted within this thesis can broadly be described as relativist: that within the social world there is no ultimate truth or actual reality, but that it is possible for different perspectives of the world to make equal sense when assessed on their own terms and within their own paradigms (Harré & Krausz, 1996). Thus, social phenomena can be accessed through multiple ways, and meaning is created by people's interaction with their world (Gray, 2014; Miles, Huberman & Saldaňa, 2014). According to this stance, I recognise that the study described in this thesis has been shaped by, and is constrained by, its particular theoretical framework and the approach to interpretation that I have taken. It follows from this position that in my investigation of how authentic real-time language use emerges in collaborative CALL environments, I have focused on interpreting the ways in which the participants construct their own processes; i.e., to make sense within my theoretical framework of their sense making.

Within this constructivist approach, a key interest is to study a phenomenon in order to capture the ‘‘interpretative process [the construction of meaning] used by the person in dealing with the things he [or she] encounters’’ (Scott & Morrison, 2006, p. 240). This approach has contributed to shaping my understanding that the participants in this study did not ‘just’ act but did so on the basis of how they perceived the particular situation and instance of the collaborative CALL environment that they were involved in, an approach discussed in Scott and Morrison (2006). Thus, action is argued to result from an emergent continuous process of meaning attribution between the subject and the environment (Cohen, Manion & Morrison, 2011; Creswell, 2009). This view of the emergent nature of meaning is consistent with the view within CT concerning language emergence. Within CT, it has been argued that language emergence is a process whereby a particular language use arises from the interaction of the elements in a system (Larsen-Freeman, 2014a). According to CT, the interaction that gives rise to the emergence of linguistic patterns is between the social (the environment) as well as cognitive aspects of the learners (the subject; as in Creswell and Cohen et al). As revealed in the studies discussed in the literature review of this thesis, the learners’ interaction with each other and with the multimodal materials in CALL activities has the potential to influence their comprehension and promote learning autonomy which in turn is expected to impact their language use.

4.3. Qualitative enquiry

The decision to frame this investigation within the qualitative enquiry research design was informed by the epistemological perspective that governs it. As a strategy of enquiry through which a researcher seeks to understand the meaning individuals or groups ascribe to a social or human issue (Creswell, 2009), qualitative research was deemed to be suitable for this research. That is, for this study, qualitative research is a suitable research design because it helps to capture data to understand the

phenomenon from within (Cohen et al, 2011; Miles et al, 2014) and at the same time to render and retain its complexity and integrity (Creswell, 2009).

Within the qualitative approach, one way to retain and display the complexity of the phenomenon under study is through processes of triangulation (Creswell & Miller, 2000). This study has data source triangulation (Lincoln & Guba, 1985) because the data about the phenomenon of language emergence in the collaborative CALL environment were collected from 12 groups within three different classes. Also, this study has time triangulation (Cohen et al, 2011) as data were collected in two phases, in the beginning and near the end of the same semester. This study has also theoretical triangulation (Yin, 2014) as the understanding of language emergence in this study was shaped by the multiple theoretical principles of CT, NH and the concept of affordances. Care was also taken to triangulate the data in order to promote the robustness and trustworthiness of this qualitative enquiry. Further details on trustworthiness appear in Section 4.5.

The study investigated the ways in which language emergence related to collaboration and interaction within the naturally-occurring context of the collaborative CALL environment and based on how the participants ascribed meaning to the ways in which they interacted in the collaborative CALL environment. The principle of investigating the phenomenon from within is one area where the qualitative enquiry design and the theoretical framework of this study align forming a sound foundation for this investigation. Deciding to investigate how authentic language use emerges in the natural setting of the CALL environments within a qualitative enquiry that operates through an inductive approach guided me to give primacy to the ways in which the participants ascribed meaning to their own processes of language use and interaction. Within qualitative enquiry and through the perspective of CT, it was understood in this study that the unit of analysis that was investigated is a phenomenon that emerges from the interaction and collaboration from within the collaborative CALL environment.

The qualitative research approach was also considered suitable for the current study because the phenomenon being investigated was contextualised and occurred in real-time. As shown in the Literature Review and Theoretical Framework chapters of this thesis, the here-and-now context influences the ways in which learners interact and use language. Gaining a holistic overview of the context of the phenomenon is one of the characteristics of qualitative research because it contributes to forming of a strong basis for understanding the latent, underlying, or non-obvious issues of the unit of analysis (Creswell, 2009; Miles et al, 2014). Accounting for the role of context while investigating the ways in which a phenomenon functions is believed to provide ‘‘multifaceted images of human behaviour as varied as the situations and contexts supporting them’’ which could be used as a basis for theory development that supports the interpretation of the phenomenon in question (Cohen, 2011, p. 18).

Guided by CT, it was accepted in this study that context shapes the global order of the language system and that through repeated experiences of language use, the global order of the language system develops (Thelen & Smith, 1994). Within CT, it is also argued that there is a mutual ‘fine-tuning’ process (discussed earlier in 3.2.3.) in the ways in which elements in the context relate to language emergence (Shanker & King, 2002). This view of the role of context in language development presents language emergence as context dependant, which is why the study was located within the natural setting within which language was used.

4.3.1. Location and participants

As stated earlier, the data for this study were obtained from one of the Colleges of Applied Sciences in Oman, and the participants were selected from English language CALL classes that took place in one of the foundation programmes. In the foundation programme at this college, one English language class from every language course is scheduled to take place in a

computer lab once a week – i.e., CALL classes, which was the reason why I chose this college and foundation programme for data collection. Prior to collecting the student participant data, I obtained contextual information about the CALL classes through preliminary meetings with the teachers. In addition, I attended some classes as an observer.

The purpose of the meetings with the teachers was to discuss the nature and characteristics of their collaborative CALL lessons as an initial phase of data collection. Given the purpose of this study, it was essential to select English language classes in which the teachers were planning to conduct collaborative, technology-based and language-related activities, which is explained in more detail in the following section. The information I gathered from those preliminary discussions with the teachers helped me identify the classes which would be suitable for the study.

Deciding to be present in the collaborative CALL classes while data were collected was in order to observe and be aware of aspects of the dynamic interaction within the collaborative CALL environments. The data gathered from the observations were used in this study to complement the information gathered by the stimulated recall interviews as the primary data collection instrument. For example, in the stimulated recall interviews with Group 1 and Group 5, the participants were referring to information on the whiteboard that the teacher wrote. That information was not captured by the video-recording cameras, but it was something I noted down while I was present in class. In other words, the information collected from the observations was used to strengthen the primary data collection instrument in this study.

Diagram 4.1 below illustrates the location of the data sources for this study. The diagram shows that in total, 12 groups of students participated in this study. Each group comprised three to four individuals, meaning that there was a total number of 38 participants from the 12 groups. Because three participants chose not to attend their group interviews, 35 learner participants contributed to the video-stimulated recall interviews, described later in this

chapter. Diagram 4.1 also shows that the participants were learners working on collaborative CALL activities in groups within three different but related collaborative CALL environments/classes. As noted in Chapter One, the foundation programme in the college at which the study was conducted offers a one year intensive English for specific purposes courses (in addition to courses in Maths and IT) in order to prepare students for their degree programmes which are taught through English as a medium of instruction. These courses are offered to the students within four levels of progression. The level of these classes were as follows: Collaborative CALL Class 1 was from level two (intermediate), Collaborative CALL Class 2 was from level four (advanced) and Collaborative CALL Class 3 was from level 1 (beginner). The reason for choosing CALL classes from different levels was to incorporate and address collaborative CALL environments in which different computer-based technology applications are used. In this location, the teachers of the language classes within the same level use similar technology applications. As the proficiency level of the students was not a factor considered in this study, the choice of levels was not linked to the type of language that might be produced, but the diversity of the groups was considered to be a way in which the robustness of the data might be tested, depending on what was found.

In Diagram 4.1, the circles containing letters represent individual participants as they appeared on the videotapes of the interviews, with ‘A’ being on the right. The circles with no letter indicate that a learner was present in the group while they were in class but chose not to attend the interview.

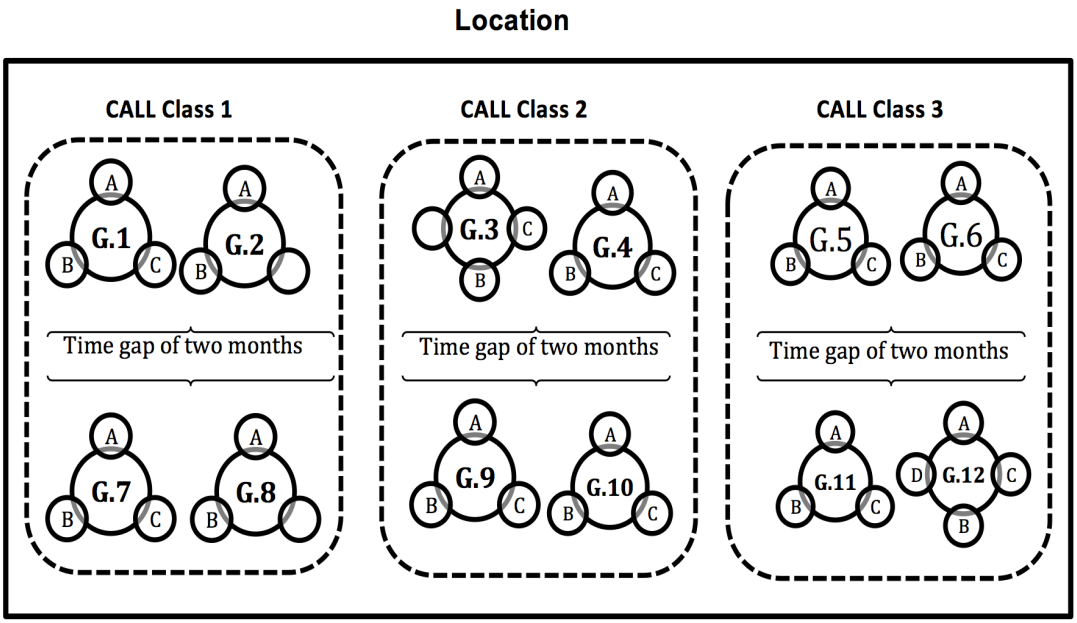

Diagram 4.1_ *Qualitative enquiry design*

It was decided that the groups of learners would constitute the data source because the phenomenon under study (how authentic language use emerges in collaborative CALL environments) was manifested within the groups, rather than the class as a whole or the individual learners. Prior to the day of data collection, I gained access and the informed consent of the participants (explained in 4.7). The choice of the two groups that contributed to data collection from each CALL class was made in the same day of data collection.

The process of selecting the groups that contributed to data collection was conducted as follows. Each class had already been divided into between five and eight groups. Depending on the class, these groups had been formed either by the students themselves or had been allocated by the teacher. For the eight groups in Classes 1 and 3, I addressed the whole class and invited volunteers; in this case the learners in these groups volunteered by raising their hands. I then explained the procedures, ensured that they consented, and arranged the cameras to observe them. I also agreed with the participants a time and place to conduct the stimulated recall interviews, which would be within a day of the observations.

A different procedure applied to the four groups in collaborative CALL Class 2. I had already placed two cameras on the front two tables before the students came in, and when students chose to sit at those tables I made them aware of why the cameras were there and gave them an opportunity to change tables. All of them expressed their willingness to take part in the study, so I reminded them about the procedures and agreed on a time and place to conduct the subsequent interviews, which took place in the main library in the morning of the following day.

As Diagram 4.1 shows, data were collected in two phases with a time gap of about two months in between. The decision to collect data at two different times within the same semester was made on the basis that the participants might act differently because they would be at a different stage of their course, which might have an influence on how they would interact and collaborate with and among each other, as well as with the teacher. The first phase, included videotaping and interviewing Groups 1 to 6 was conducted within two weeks. The second phase occurred about two months later and included data collection from Groups 7 to 12. This also took about two weeks. Deciding to video-record and interview two groups from each class at a time was based on the procedures and requirements of the data collection instrument, as explained in 4.3.3 below. With two groups at a time, it was possible to video-record the Collaborative CALL activities which were part of a 110-minute class, review the video-recordings and identify prompts to use in the interviews.

The following table summarises the learning objectives and the technology that was used in each of the collaborative CALL activities within the three classes. However, it should be noted that the learning objectives and the language goals were incidental to the main aim of this study. The table is presented here to provide a certain depth of contextual and background information.

Class	***Groups***	***Technology***	***Stated learning Objectives***
Class 1	**1** and **2**	The Web/search engines	To read for general and specific

			information about famous scientists and explorers
	7 and **8**	The Web/ search engines	To practise language of comparing and contrasting
Class 2	**3** and **4**	Blogs	To practise language of opinion giving
	9 and **10**	Google Docs	To practise question formation (for online questionnaire)
Class 3	**5** and **6**	The Web (specific websites for hotel booking and findings information about famous tourist destinations)	To practise specific language of holiday planning, as writing and speaking skills.
	11 and **12**	The Web (with a recommendation to use the Guinness World Records official site)	To practise forming indirect questions (for a board game)

Table 4.1_*Collaborative CALL classes, technology and stated learning objectives*

As Table 4.1 shows, the participants in the three classes were involved in collaborative CALL activities that incorporated the use of computer-based technologies (i.e., not tablet-based nor mobile-based). The technology used in these classes ranged from using search engines to search for specific and general information to using specific computer-based applications such as blogs and Google Docs to practise specific language (e.g., opinion giving). The learning objectives in these collaborative CALL classes also varied from reading for specific information to practising yes-no and information question formation while creating online surveys.

4.3.2. Data collection

In qualitative research, observations have been used to capture the physical, social/cultural, and linguistic contexts of the studied behaviour in order to help enquirers to collect as a full account as possible of the events under

study (Bell, 2005; Borg, 2006; Cohen et al, 2011; Duff, 2008). This view of the use of observations as a tool to capture the wholeness of the natural context within which the phenomenon is investigated has led other researchers to suggest using stimulated recall in conjunction with the use of observations (Fox-Turnbull, 2009; Lyle, 2003; Slough, 2001). As noted earlier, this idea formed the basis for the decision in this study to use observations in order for me as the researcher to be aware of the natural context in which the collaborative CALL activities were carried out.

The observations were used as a source of data for establishing background and contextual information for me, and helped contribute to the development of some of the questions that I used in the stimulated recall interviews. By being on site while data were collected, I developed an understanding of the phenomenon's macro-context which helped to form some of the questions in the interviews and to interpret some of the data. By attending and observing the classes, I was able to observe and understand issues that influenced the ways in which the participants carried out the collaborative CALL activities. For example, I was able to observe how the groups were set, what was on the whiteboard, the teacher's movement, interaction and feedback. This knowledge helped me contextualise some of the participants' responses. For instance, in some of their responses in the interviews, the participants were referring to information from the whiteboard (Group 5) and to their interaction with other groups (as in Groups 2 and 5) that influenced some of their actions and decisions within their own groups.

While observing the collaborative CALL classes, care was taken to minimise reactivity as the aim of this study was to investigate the phenomenon as it occurs in its natural setting. To that end, I assumed a non-participant role. The teachers as well as the participants had been informed of this non-participant role before the observations took place. It was recognised, however, that the role of non-participant observer could potentially compromise authenticity in the way learners would work on the collaborative CALL activities as the mere presence of an observer in the class would

inevitably have an impact on both the teacher and learners (Borg, 2006). Therefore, in good time prior to the observations, I talked the teachers and learners through what would help to decrease their reactivity for being observed. For example, the observed teachers and learners were made aware of the nature and purpose of this study, and they were assured that the observations were not part of an assessment, appraisal or inspection, so they should try to act naturally and not think of what I might wish to observe. Coming from the same context as the teachers and participants, I anticipated that reactivity could be an issue. However, with a sufficient discussion and clarification of the research purposes, I strived to minimise reactivity to my presence as an observer, as Borg (2006) suggests.

Within the qualitative approach, interviews are one of the instruments that are used by researchers aiming at investigating a phenomenon from within. The use of interviews in social sciences has been described as a tool that provides access to what is 'inside a person's head' and makes it possible to gain an understanding of what a person knows (knowledge or information) likes or dislikes (values and preferences), and what a person thinks concerning his/her involvement in the phenomenon being investigated (Tuckman cited in Cohen et al, 2011). This description reflects the suitability of using interviews in the current study which aims at investigating the process of language emergence within collaborative CALL environments as interpreted by the participants themselves. To gain an understanding of the phenomenon, it was decided to use semi-structured, stimulated recall interviews to provide the participants with opportunities to demonstrate their interpretation of their own processes of language emergence within the collaborative CALL environments they were involved in – i.e., the meaning they made of their lived experiences (as in Silverman, 2006). The semi-structured nature of the interviews in this study allowed for probing which is a technique believed to be useful to explore as deep as possible the meaning ascribed to the phenomenon by the participants (Gray, 2014). In addition to being semi-structured, the interviews in this study involved the use of video stimuli in order to aid the participants to remember and comment on what happened during those processes of collaboration and language use.

4.3.3. Stimulated recall

Stimulated recall has been described as a research tool that helps participants to relive the episodes of their behaviour (Borg, 2006) by providing them with the opportunity to maintain the real life context of that activity (Dempsey, 2010; Lyle, 2003). It has been noted that stimulated recall is suitable to uncover the different contexts and characteristics of interactions that influence the participants' behaviour (Dempsey, 2010), and it, at the same time, helps to explore some aspects of the thought processes of the participants (Dempsey, 2010; Lyle, 2003; O'Brien, 1993). Unlike think-aloud protocol which is used in other studies to gain an understanding of participants' thinking processes, stimulated recall is argued to be more appropriately used in studies that do not seek to interfere with the performance of the activity being examined, which is the case in the current study. In a previous study that aimed to evaluate the use of stimulated recall in gaining insight into the thinking behind participants' decision making to meet specified goals while working on technology-enhanced learning activities, it was concluded that the stimulated recall interviews allowed the researcher insight into the participants' thinking processes and to their understanding of technological practices and processes (Fox-Turnbull, 2009). Additionally, in other qualitative studies, it has been found that using stimulated recall is an effective way to explore how the mechanisms within the use of ICT-tools facilitate meaning negotiation processes (Beers, Boshuizen, Kirschner, Gijselaers, & Westendorp, 2006), to investigate tacit knowledge and thought processes in classroom dialogues (Powell, 2004), and to access the thoughts of subjects engaged in a language activity (Slough, 2001).

The arguments in those studies informed the decision in the current study to use stimulated recall as a tool to help the participants relive their experiences in the collaborative CALL classes and in retrospect provide a reliable verbalised account of the original activity. By helping the participants relive certain moments of the original collaborative CALL activities, it was my aim to

capture what was necessary for investigating language emergence and interaction in collaborative CALL environments (as in Lyle, 2003). That is, stimulated recall was the instrument that was used in this study to investigate why the participants chose to act in certain ways and to explore the ways in which their actions related to their thought processes and to their language use.

A number of recommendations have been suggested in previous studies that can improve the efficiency of stimulated recall as a data gathering tool in qualitative research. Fox-Turnbull (2009) provides a list of these recommendations after reviewing a few studies that used stimulated recall. These recommendations were taken into consideration in this study, which included:

- Aiding the participants to understand the procedures of the stimulated recall and what their role was.
- Conducting the stimulated recall interviews as soon as possible after the collaborative CALL events.
- The stimulated interviews were video-recorded so that the participants' interaction and conversations would be easily comprehended by the researcher.
- Video stimuli were used in order to aid the participants to recall more easily and accurately.

The details of the procedures in which the stimulated recall interviews in this study were conducted are presented in more detail in the following sections.

4.3.3.1. Strengths and limitations of stimulated recall

It has been reported that one advantage of stimulated recall is that it allows participants to explain their decision making and thought processes behind their actions (Lyle, 2003; Mackey & Gass, 2005). This is relevant to this study since it operates through a qualitative approach to investigate the

phenomenon through the ways in which the participants interpret their own action, interaction and language use within the collaborative CALL environment. Also, the use of stimulated recall allows including multimedia sources by which specific cues and instances from the studied environment can be reintroduced in order to increase the likelihood of the participants recalling and being able to report their thought processes at such particular instances of the activity. In this study, the use of stimulated recall made it possible for me to use video-recorded instances of language use and interaction from the collaborative CALL activities as prompts for the participants to recall and report why they were acting in certain ways and their thoughts behind using certain language in those instances.

One more advantage of using stimulated recall is that it requires minimal training of the participants into the procedures of conducting stimulated recall interviews, as noted by Slough (2001) and Powell (2004). In the current study, I explained the procedures of the interviews and what is expected from the participants in a few minutes at the beginning of the interviews. I explained to the participants that they would watch episodes from the collaborative CALL activities that they had just carried out and would be asked to report on what they were thinking as they were acting and using language.

It has been recognised, however, that the use of stimulated recall can result in reflections on what should have happened instead of reporting what happened (Borg, 2006). To mitigate this issue, it has been suggested that the questions used in the stimulated recall interviews are to be phrased in a way that prompts the participants to recall and report why they were acting in certain ways (Dempsey, 2010; Lyle, 2003). Informed by this idea, the prompts used in this study were presented in a way that aimed to encourage the participants to recall and retrace their thought processes while acting and interacting in certain ways not to reflect on what they saw in the video-recordings. For example, a question like ‘There, when you suddenly pointed at the screen, what were you thinking?’ invited the participant to recall his/her thinking and encouraged them to verbalise their thoughts at that point in time.

This kind of questions, as has been argued elsewhere, does not lead to a certain answer, and it does not ask to reflect on idealised actions (Borg, 2006).

Another limitation of stimulated recall is that it does not capture a full account of the participants' actual behaviour due to the complex and dynamic nature of the classroom interaction (Lyle, 2003; Plaut, 2006). Through the theoretical perspectives of this study it was understood that investigating the phenomenon of language emergence in collaborative CALL environments would be enhanced by accounting for the micro- as well as macro-context within which the collaborative CALL groups functioned. Therefore, as explained earlier, it was decided in this study that I would be present in class while the learners carried out the collaborative CALL activities.

Although I explained how the interviews would be conducted and what would be expected from the participants, on a few occasions the participants tended to provide general comments and reflections on what was happening rather than providing an account of their thoughts and reasons for acting and interacting in certain ways. In such cases, I had to repeat and rephrase the questions to invite the participants to recall their thoughts. There were also instances when the participants themselves helped each other remember by asking each other questions. For instance, in the stimulated recall interview with Group 2, I asked one of the participants (A) about why she was pointing at the screen to which she responded, 'Because I knew she [B] would not be able to see that'; then immediately 'B' said to 'A', 'No the information that made you point?'. This interaction not only shows that the participants helped each other to remember but it also reflects that they understood what was required from them in the stimulated recall interviews.

4.3.3.2. Video-recordings as recall stimuli

The video-recordings of the collaborative CALL lessons were used in the interviews to provide the participants with the necessary stimulus to help

them recall and report as accurately as possible the thoughts behind certain language and non-language interaction and use. The purpose of using videos as part of the stimulated recall interviews was to enable the participants to re-live the original collaborative CALL situation, so far as it was possible. The use of videos in stimulated recall interviews is believed to have a capacity to accurately and vividly provide a sufficient number of episodes of the phenomenon being investigated (Gass & Mackey, 2000). In this study, the use of video-recordings as the recall stimuli for the participants helped preserve the language-based and non-language-based characters of the interactions from the collaborative CALL environment (Duff, 2008). The use of video-recordings also offered comprehensive material that enabled a sufficient analysis of the language processes in the investigated collaborative CALL environments (as in Cohen et al, 2011).

To video-record the collaborative CALL activities, I used one Sony DSC-HX400V and one Nikon D5600. While using both cameras to video-record the collaborative CALL activities, I used tripods so that I could set the cameras at an angle that made it possible to observe how all the participants in the groups interacted among each other and with the computer. As the seating plan (appendix 1) shows, I placed the cameras above the computer screen facing the participants so that the participants' facial expressions and non-language-based interaction within their groups would be recorded.

The use of both cameras had its merits and challenges. Both cameras were fitted with a built-in microphone that captured volume that was audible at most times; however, there were instances when the conversation between the participants was hard to decipher. For these instances I started playing the episodes from a point earlier so that the participants could remember and contextualise their interaction and answer my questions. The most useful feature about the use of these two cameras was that they both used detachable memory cards for data storage. This feature made it very easy for me to transfer the video-recordings from the cameras to my laptop, and made reviewing the video-recordings and preparing probes for the stimulated

recall interviews possible within 24 hours of the collaborative CALL event. I found using the Sony DSC-HX400V easier than Nikon D5600 especially because it was fitted with rechargeable batteries that last for about two hours – longer than the class time which was 110 minutes. For the Nikon D5600, I had to use disposable batteries which I had to change every 90 minutes.

4.3.3.3. Criteria for stimuli selection

Because the video-recordings were of the whole 110-minute collaborative CALL lessons, it was not possible to play the full videos to the participants who expressed that they would be able to take part in 30 to 60 minute-interviews. The interviews were conducted in the two-hour break that the participants had between their classes; that meant having no longer than one-hour interviews per group of each class. Hence, I had to select specific video episodes to use in the stimulated recall interviews.

The video episodes that the participants watched were selected by me prior to the interviews. The selection of the episodes to be used as stimuli in the video stimulated recall interviews (VSRIs) were based on two criteria. The first criterion was whether they illustrated forms of collaboration and language use as these were the key areas of interest in this study. The second criterion was the existence of physical signs of noticing such as sudden pointing at the screen and changes in facial expressions as well as linguistic indications of noticing, for example, when a participant started or tried to use a particular language form such as grammatical or lexical forms. Although it was decided in this study to investigate the phenomenon through an inductive approach, the setting of specific episode selection criteria does not contradict that approach. As has been argued within the thematic analysis literature, data ‘‘are not coded in an epistemological vacuum’’ as any approach that seeks to identify the features that give meaning to a phenomenon ‘‘is not just description but is already theorized’’ (Braun & Clark, 2006, p. 84). The following table presents a sample of some of the features that reflect the criteria according to which episodes from the collaborative CALL event were used as stimuli in the VSRIs.

Features of the selected VSRI episodes	***Example data extracts (From Chapter Five)***
Participants starting to utter a word as they were reading on the screen.	Extract 39
Participants change from reading on the screen to asking another group member.	Extract 45
A change from reading on the screen or discussing to calling for the teacher.	Extract 31
Pointing at the screen.	Extract 24
Changes on facial expressions or while reading on the screen or discussing with a group member.	Extract 49
A change from reading on the screen to typing in using the keyboard.	Extract 21
As they were given instructions by the teacher, questions about their thoughts.	Extract 25
A change from reading or discussing to using the mouse.	Extract 32
A change from reading or discussing to using physical materials (e.g., notebooks or hand-outs).	Extract 44

Table 4.2_ *Features of the selected VSRI episodes*

As shown in Table 4.2, the selected episodes were used to help reactivate and refresh recollections of the learner's language-use processes as well as their ways of interaction. Thus, the prompts that I used included:

- *There, when you pointed at the screen what were you thinking?*
- *What was in your mind when you said '…'?; what made you say "…" here?*
- *There I see you suddenly turned to the computer, what were you thinking about?*
- *Why did you use that word, what were you trying to say?*

- *Why did you choose that information to write a question about?*
- *What did you do that helped you find that answer?*
- *What were you thinking when the teacher was giving you these instructions here?.*

Additionally, as some of the features of the selected episodes indicate, the video recordings were stopped at certain points to ask the participants about what they were thinking and about the reasons behind some of their language as well as non-language behaviour. This procedure was informed by the idea that the 'stop and remember' form of VSRIs helps participants to recall and verbally report their thoughts during the interactive processes of the activity (Lyle, 2003). It has been reported that videotape recall responses are 2-4 times greater than free recall (Lyle, 2003) and 95% accurate (Bloom, 1954, cited in Gass & Mackey, 2000).

4.3.3.4. Recall prompts

Although the questions and probes that were used in the VSRIs were primarily initiated by me, the participants were encouraged to ask to stop the videos at any point to say something about their interaction and thinking processes, which the participants did on a few occasions. For example, when I showed the participants in groups 1 and 2 video episodes in which they were uttering certain words, they asked to replay the video from a certain point they chose so that they would remember that instance. This procedure shows that participants had some shared control over the VSRI session and the episodes that they chose to comment on. The aim of this procedure was to create a dialogic and low formality atmosphere, so that the participants would feel less constrained. This procedure also shows that the structure of the VSRIs in this study was flexible. As has been argued, the less structured the interviews, the higher the possibility for verbalisation by participants there will be (Gass & Mackey, 2000).

To further ease and enhance communication and interaction in the VSRIs, the participants had the freedom to communicate in either Arabic (their L1) or in English. The prompts and questions were given in Arabic (by me whose L1 is Arabic too) to ensure understanding, and the participants were encouraged to ask for clarification when needed. In responding to my prompts, the participants mostly used Arabic. Moreover, because it was the collaborative aspect of the CALL environments that was of interest in this study, the participants were interviewed as groups. In the same groups that they worked in during their class, the participants were interviewed in one setting and they were encouraged to interact between and among themselves, which might have aided each one of them to recall more. There were also specific prompts that were presented to individual participants to respond to and provide an account of his/her thought processes. All these procedures – i.e., the use of non-leading questions, low structured and dialogic interviews, using the participants' L1, and conducting the interviews within a 24-hour window from the collaborative CALL event - contributed to support the rigour of the process through which these VSRIs were conducted.

4.4. Data analysis

Thematic analysis was the method used in this study to analyse the data generated from the VSRIs. Deciding to choose thematic analysis was guided by the principles of the type of inductive approach that underpins this research. Through an inductive approach, the processes within the method of thematic analysis helped me in this study to address the phenomenon of language emergence in the collaborative CALL environment by detecting patterns from the data in a bottom-up way (data-driven patterns). That is, the method of thematic analysis helped me to identify, analyse, and report patterns from within the data (as in Boyatzis, 1998) and to extract meanings and concepts to address the current research questions (Javadi & Zarea, 2016).

In this study thematic analysis was used as a process that began with coding, which is described in the literature as capturing and labelling occurrences that relate to the phenomenon under study (Boyatzis, 1998). In this study, the first step in the process of coding was transcribing the VSRIs (Samples of transcripts are provided in Appendix 2). The VSRI transcripts were then used as the basis for capturing relevant occurrences of the phenomenon and for developing the codes. The identification of codes in this study was at the latent level of the data as the coding process involved identifying and examining underlying ideas and conceptualisations (Braun & Clark, 2006). That is, in my analysis, I strived to explore beyond the semantic content of the data to explore the underlying assumptions and conceptualisations that led to the participants' responses. As has been argued, the inductive process of developing codes through capturing and labelling occurrences with no coding frame still requires an anchor upon which a code can be identified (Boyatzis, 1998). Braun and Clark (2006) have described this anchor as the core idea which is something important about the data in relation to the research question(s) that helps to unify patterns in the data. Informed by this idea, it was decided in this study that the anchor was whether or not the participants' responses to the probes in the VSRIs related to their language use and/or to the ways in which they interacted and collaborated in the collaborative CALL environment. To illustrate, the following extract is from the data set generated from Group 1, and it shows what was coded and how it was coded. This example extract also shows what did not receive a code.

Data Extract (R= researcher, A, B, C = participants)	***Initial codes***
1 R. Here you started saying 'scientist, scientist' and you were typing *2 something.* *3 What was in your mind? What did you want to say?* *4 B: I think it was 'what doing', 'what doing' [In English]. It was talking* *5 about something that the person did, the scientist.* *…*	
6 A: We thought that the scientist we have to choose is different. 7 I mean he/she invented something	***Anticipation***
8 C: We thought of a scientist, a new scientist we did not know about; 9 so we put scientist so that we know a bigger group of scientists.	*Entering generic terms*

10 R: Ok, so the minute you saw the screen, after typing scientists,	
11 what came into your mind?	**Topical**
12 A: The minute we saw Marie Curie; we remembered what she	**Background**
13 invented/explored and how she died and the impact of her	**knowledge/**
14 exploration on the world.	**Visual and textual**

Table 4.3_*A coding sample*

To explain, the example extract in Table 4.3 shows that lines one to five from this part of the data did not receive any code because the participant here was describing what was on the web-page without an explicit link to her language use or collaboration. I followed this up with more questions and prompts in order to help the participant recall and report her thought processes at that instance. The data on lines 6 to 7 were labelled 'anticipation' as it seemed to illustrate the idea that the participants had as they started their Web search, 'We thought that the scientist we have to choose is different'. Lines 8 to 9 were seen as an illustration of an action that proceeded and coincided with starting the activity (entering 'scientists' into the search engine) and a link to what they said they thought about as a goal for entering 'scientist' into the search engine, 'so that we know a bigger group of scientists'. Lines 12 to 14 show an instance that initially received two possible codes as they illustrate a process of schema activation (topical background knowledge) and at the same time illustrates the influence of images being part of the webpage on what information the participants decided to select. The coding of these three lines also shows how I was able to access multimodal material, i.e., through the responses of the participants in the stimulated recall interviews in which they reported their thought processes as they attended to multimodal cues, not the computer-based material itself.

In the process of thematic analysis in this study, these codes were developed in a back and forth process between them and the patterns they were developed into. The development of such codes is explained in more detail in the following chapters. Some of the initial codes in this study were discussed

with the lead-supervisor for verification and cross-checking purposes as a way to enhance trustworthiness, as discussed below.

It has been suggested that the process of thematic analysis is inductive when the questions that are asked of the participants bear little relation to the research questions or theoretical basis (Braun & Clark, 2006). Section 4.3.3.3 above and the extract in Table 4.3 present a sample of the questions that were asked of the participants. The questions were about language-related actions and thoughts within those instances of interaction and not about an item from a coding frame that was created for analysis based on preconceived ideas or assumptions concerning the phenomenon under study. Moreover, the process of coding and categorising the codes in this study was never a linear process. The process of coding and theming was 'reflexive' and 'fluid' (ibid.). In that reflexive process, I was actively involved in labelling, relabelling, splitting and merging the codes leading to the final shape they are presented in in Chapter Five. A sample of the actual coding process is provided in Appendix 3 which shows how some of the codes in this study were developed.

As presented in the Findings chapter of this thesis (Chapter Five), the prevalent and diverse nature of some codes in this study helped me to compare and contrast them within and across the three classes. This process of comparison made it possible for me to organise the codes into groups based on prevalence and variation. Each of these groups addressed aspects of the phenomenon under study. With further organisation and development of the codes, two themes were identified that helped me to address the research questions. This process of code development was the reason why it was decided in this study to present the findings per group (in Section 5.2 of the Findings chapter) as well as per class (in Section 5.3). That is, the purpose of the class-by-class as well as group-by-group analysis in this study was to identify connections and common relations (as in Cohen et al, 2011, Miles et al 2014) in order to develop key themes from the codes generated by each data source within each class and address the research

questions which are concerned with the relationship between the ways in which the participants interacted and collaborated within the here-and-now context of the collaborative CALL environment and the emergence of language use.

4.5. Validity

Within qualitative research, the rigour and accuracy of the findings can be assured and assessed through a number of strategies that have been referred to using different terms including 'trustworthiness' (Lincoln & Guba, 1985). This was seen as constituting four criteria: credibility, dependability, confirmability and transferability. Since that seminal work was published, there have been multiple interpretations of and additions to this concept, one consequence of which is that the term 'validity', once clearly associated with positivist ideas of accuracy, truth and reality, has now been broadly integrated into the scholarly literature on research methods to refer to qualitative as well as quantitative research, and to describe the concepts once categorised as comprising trustworthiness. This includes some of the literature referred to in the paragraphs below. Thus, this section has been given the heading of 'validity', although what follows is an explanation of the various ways in which this qualitative study sought to achieve quality and rigour.

One of these strategies that the current study implemented to achieve trustworthiness was the process of triangulation. As discussed in detail earlier, (in Sections 4.3.2 and 4.3.3), by examining and converging evidence from multiple sources of information at different times in order to identify patterns and themes, data, time and theoretical triangulation contributed to enhance the qualitative validity in this study (Creswell & Miller, 2000). Triangulation is one key way of meeting the criterion described by Lincoln and Guba (1985) as credibility.

Another strategy used in this research to achieve rigour, or dependability to use Lincoln and Guba's (1985) term, was auditing trails of evidence. It has been suggested that to establish an audit trail, researchers need to provide a clear documentation of all research decisions and procedures (Creswell & Miller, 2000). This chapter as well as the previous two delineate the decisions and choices in this research concerning the philosophical paradigm and underpinning theoretical perspectives. The current chapter also describes the processes through which the data were collected and analysed, as in Sections 4.3 and 4.4.

While it is recognised that the value of qualitative research lies in the description of the phenomenon within a particular context and setting, it is still argued that findings of qualitative research can be translated into other contexts (Creswell, 2009). The capacity of the results in qualitative research to translate into other contexts is considered one way to assess validity (Cohen et al, 2011). It has been suggested that with a clear and in-depth description of the typicality of the participants and setting, data and findings of the qualitative study can be transferred into other settings within similar communities and situations; in other words, that it should have transferability (Lincoln & Guba, 1985). Being a naturalistic qualitative enquiry that investigated the phenomenon of language emergence within a particular context, this study sought to provide a detailed description of the classes, participants, phenomenon and the procedures of the data collection and analysis procedures, as has been presented in the current chapter.

It has been also suggested that a greater validity in qualitative research can be achieved through being aware of one's own biases and to minimise them as much as possible (Bourke, 2014; Dean et al, 2017; Simeon, 2015). By addressing my possible biases in this research, I acknowledged my active role in the research ''as both the enquirer and the respondent'' (Lincoln, Lynham & Guba, 2011). As presented in Section 4.6, I reflected on my positionality and on being mindful of issues that might have an influence on the ways in which the data were collected and analysed. The purpose of the self-reflection in this thesis is to consider my biases and to create 'an open

an honest narrative' that would resonate with readers (Creswell, 2009). The account of my positionality in Section 4.6 includes a discussion on aspects of my background such as gender, age and education as well as issues related to my theoretical perspectives and some preconceived notions that might have impacted the collection and interpretation processes of the data.

Another strategy to achieve validity in qualitative research, or addressing Lincoln and Guba's (1985) criterion of confirmability, is through discussing disconfirming evidence and contrary information, information that runs counter to a certain pattern within the data (Cohen et al, 2011; Creswell & Miller, 2000). In the current research, within each theme, there are data that illustrate disconfirming evidence about the role of certain components within the collaborative CALL environment. For instance, the data presented in Chapter Five, show that within Class 2, the role of the teacher's feedback and interaction with Group 10 aided the participants to improve their answers but with Group 9, it had a negative effect as one participant explained that she felt confused when the teacher approached them and asked for clarification of what she was working on (Section 5.3.2.3.2). Similarly, the data in Chapter Five show different roles of the use of images, worksheets and background knowledge in the collaborative CALL environment that had variable influences on the ways in which the participants interacted and accomplished the activities.

4.6. Positionality

Positionality has been described as the ‘‘space in which objectivism and subjectivism meet'' (Bourke, 2014, p. 3). The reason for providing an account of my positionality in this study was to reflect on my awareness of what was involved in the process of data gathering and analysing. It has been suggested that the rigour and cogency of the process of data collection and analysis in qualitative research is influenced by the researcher's positionality, which involves the ways in which the researcher relates to the participants and how the participants perceive the researcher (Bourke, 2014; Dean et al,

2017). Acknowledging my positionality in the process of data collection and analysis in this study helped me to be aware of the ways in which I was engaged in the research process. Also, being aware of my positionality helped to recognise my own biases, which are necessary to be aware of as ‘‘biases shape the research process’’ (Bourke, 2014, p. 1) and try to minimise their consequences on data collection and analysis (Simeon, 2015). According to studies on positionality, or what is sometimes referred to as *reflexivity* as in Macbeth (2001) or *positional reflexivity* in Cousin (2010), I addressed my positionality in this study through acknowledging and being aware of my personal account, theoretical perspectives and own preconceived notions of what is important in the collaborative CALL context.

One way for me in this study to be cognisant of my positionality is through acknowledging my social and educational background in relation to that of the participants’. It has been proposed that the interaction between researchers and participants is formed through social processes and institutions that classify them according to factors such as ethnicity, education, religion and gender (Cousin, 2010). In this study, I shared with all the participants their nationality with the exception of one participant (who was Yemeni on a scholarship from his government). I was male in my early 30s, and the participants were males and females of 18 to 20 years old. The participants’ gender was as follows:

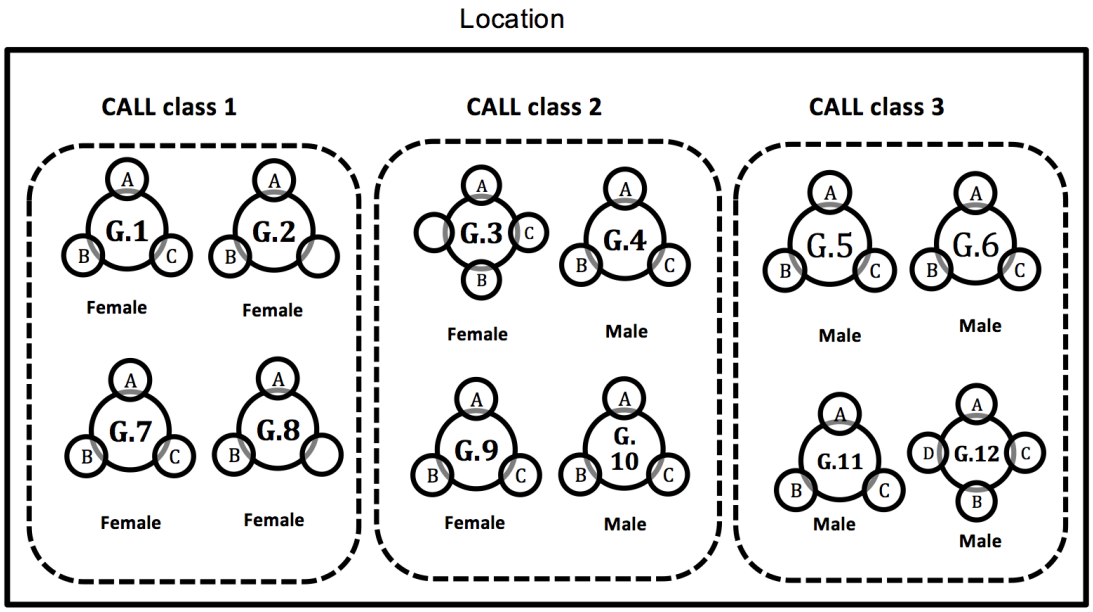

Diagram 4.2_ *Gender of the participants*

I obtained my BA from a different institution to the one where this study was conducted and then obtained an MA in TESOL from the UK. By the time I collected the data, I had had four years of experience teaching English in a foundation programme of a Higher Education institution unrelated to that of the study. The participants were enrolled in a BA programme majoring in Business, IT and Engineering. The data in this study were collected for my PhD, for which I was funded by the Omani government. The participants were also on scholarships from the same government (except for the Yemeni participant). The area (CALL) to which the topic of this PhD relates was initially decided on by the funder, although I decided on the specific focus myself. Although this personal and educational account helps determine where I stood in relation to the participants, it highlights an issue that I was aware of while collecting and analysing data. That issue was about what it could entail for the teachers (two of whom were expatriates) to allow a young national researcher funded by their employer to observe and video-record their lessons, which happened to be at a critical economic situation with the severe drop on oil prices that was responded to by the government through various procedures including downsizing colleges. This situation might challenge the extent to which it was accurate to describe the classes observed for data collection in this study as not being arranged for research purposes. However, this was addressed by assuring the teachers, through

preliminary discussions with them and the information sheets with which I provided them (Appendix 4), that the data in this research would be used solely for research purposes and that it had nothing to do with their appraisals. They were also assured that their identities would never be disclosed and all the data would be kept in password-protected devices.

By the time I started the process of data collection and analysis, I had decided on the theoretical perspective that would underpin this study. As discussed in Chapter Three, CT and NH were selected to be the theoretical perspectives that made up the theoretical framework in this study. These theoretical perspectives formed the basis of my understanding that the emergence of language use instances could be explored through examining how the participants would relate to cues in the environment they were functioning within. Based on this position, I sought to find out the ways in which that relation might happen and how the micro- and macro-contexts might impact it. I was aware that this theoretical stance might have had an influence on the type of questions I asked in the VSRIs. As suggested in studies on positionality, researchers should acknowledge and be aware of the possibility that the participants can make sense from the questions as to what the researcher wants to hear (Cousin, 2010). To avoid this possible pitfall, I used questions that were open enough for the participants to be able to report what happened and what they were thinking rather than eliciting what I wanted to hear in relation to my theoretical position. Section 4.3.3.3 presents more details about the questions asked in the VSRIs.

Given the personal, academic and theoretical position of me as the researcher in this study, as presented above, I had my preconceived ideas about the context and participants. Reflecting on such ideas is believed to be necessary to avoid invalidating the research as biased or contaminated (Simeon, 2015). For example, I was under the impression that access would be guaranteed as I presented a formal letter from the ministry that governs that institution requesting collaboration with me (Appendix 5). While that letter helped me to gain access to the location, access to the three classes

was based on a discussion between the teachers and me with no administrators present. The reason for that procedure was to avoid the coercion effects that letter might have on the teachers and for me to decide whether those classes were collaborative CALL-based or not. Through that discussion, the three teachers of the selected classes had the chance to give their informed consent and to ask me about the nature and purposes or the study.

I also had preconceived notions of the participants. For instance, being male, I had serious doubts about gaining the female students' consent to be videotaped because of cultural considerations. I also had low expectations about how collaborative the participants would be in terms of finding time within 24 hours after their classes for the VSRIs or whether or not they understood the purpose of the interviews. After two of the VSRIs, the participants asked me about how they did, which made me question the extent to which those participants knew why they were being interviewed and were asked those questions. However, the participants in general not only collaborated with me in the process of data collection but also showed interest in the research topic. Some of the participants asked me to share with them the outcomes of the study and they exchanged emails with me for that reason.

4.7. Ethics

Because this research involved collecting data from people about people and the ways in which they collaborate and use language, ethical concerns were taken into consideration in order to (a) protect the participants against harm (such as personal disclosure), (b) develop trust with them and (c) promote the integrity of the research as recommended by (Creswell, 2009). In this study, ethical issues were anticipated to arise with regard to access and consent. The following two sections present how ethical issues regarding access and consent were addressed in ways that conform to the guidelines of the British Educational Research Association (BERA, 2011).

4.7.1. Access

The target location of this study was one of the public Higher Education institutions in Oman. Being fully sponsored and funded by the Ministry of Higher Education which governs this institution, I had easy access to this institution. I was supported by an official letter from the Ministry of Higher Education (Appendix 5) requesting full collaboration. Nevertheless, I strived to leave a positive impression on the gatekeepers as well as the teachers by being cognisant that from that first meeting they would have perceptions of me and my intentions and that these need to be positive (Cohen et al, 2011). I tried to positively influence such perceptions by presenting myself as competent and trustworthy. The first step towards access was meeting the head of the English department in that institution. In that meeting, I provided the head of department with some of my personal and professional details, my research topic, aims and the planned procedures of the data collection. As a result of that meeting, the head of the department sent an email to all the staff introducing me to them and informing them about my research interests and intentions. In the email, the head of the department informed the teachers that I would be present at the institution in the following week should they wish to contact me and take part in my research. In that following week, I met with seven teachers in meetings that did not involve a third party. Those teachers informed me that they use technology in their classes regularly, and they expressed interest in taking part in the research project. Choosing the three teachers whose classes would be the sources of data in this study was on the basis that their classes were planned (by the teachers) to (a) incorporate the use of technology, (b) to be based on group work, (c) and to target language learning objectives. The technology and general objectives of the selected lessons that the three teachers planned are presented in Table 4.1 in Section 4.3.1, above.

4.7.2. Informed consent

The class teachers as well as the learners within the three classes were briefed orally and in writing about the study and provided with the opportunity to ask questions and to choose whether to take part in this research or not. I met with the class teachers first, as noted earlier, and I gained their consent and then met the learners in their classes. Before gaining the learners' consent, the learners in the three classes were first made aware of who I was and what I was studying and where, and they were helped to understand the nature of the research and what their role would be within it. Prior to data collection, this information was presented to them by me in their L1, and then they were given the chance to decide whether to take part or not (as in Israel & Hay, 2006). Some of the participants agreed and signed the consent there and then and others asked for some time which they were given. From the three classes, only one learner chose not to take part and therefore her group was excluded. That is, the procedure in gaining the participants' informed consent in this study was earned after (1) supplying sufficient information about the researcher and research project, (2) facilitating comprehension on the part of the teachers and learners, and (3) striving to assure voluntary participation (Cohen et al, 2011; Mackey & Gass, 2005).

After the oral introduction about myself as the researcher and this research project, the participants were handed an informed consent document (Appendix 6) to sign and return to me. The document reiterated what had been orally introduced that the focus of the research was on the computer-based collaborative language activity and that I was interested to see how learners collaborate in such activities. It also described that I would attend two of their classes to observe and video-record the interaction of two groups using video cameras. Additionally, the document clarified that within 24 hours after the class, there would be a group interview of about an hour between me and the learners in those two groups. The document emphasised that the interviews were planned to take place within the 24 hours after the observed lesson. It also explained to the learners that in the interviews, they would watch episodes of their videotaped language activities and would be asked some questions about them. In short, the learners and teachers in the three classes of the study were made aware that they were being observed by me

as the researcher using video recorders. As has been suggested, ensuring that the participants are aware that they are being videotaped and aware of who is videotaping them and using what tools contributes to make the procedures of data collection ethical (Borg, 2006; Yin, 2014).

The informed consent document assured the participants that the data would be used solely for the purposes of this study and probably for other related academic purposes, such as academic publication and conference presentations. However, the identity of the participants would never be publicly disclosed. In the thesis, the means of ensuring anonymity was achieved by using letters (A, B, C and D representing the members within the collaborative CALL groups). I also assured them that all data would be kept secure in password-protected electronic devices and applications (offline and online) to which only the researcher and his two supervisors would have access.

Obtaining informed consent meant that I reached an agreement with the participants regarding this research project. What follows now is to keep the procedures of this research ethical by keeping that agreement (as suggested in Blaxter, Hughes & Tight, 2010). Gaining voluntary informed consent and keeping it as an agreement between the participants and me helped me to conform to the guidelines of the British Educational Research Association (BERA, 2011).

4.8. Summary

The study adopted a qualitative enquiry design and was guided by an inductive approach that was intended to explore connections and correlations of the phenomenon from within; by interpreting how the participants ascribe meaning to the phenomenon in question. The following diagram summarises how the research questions, instruments and participants relate in this study.

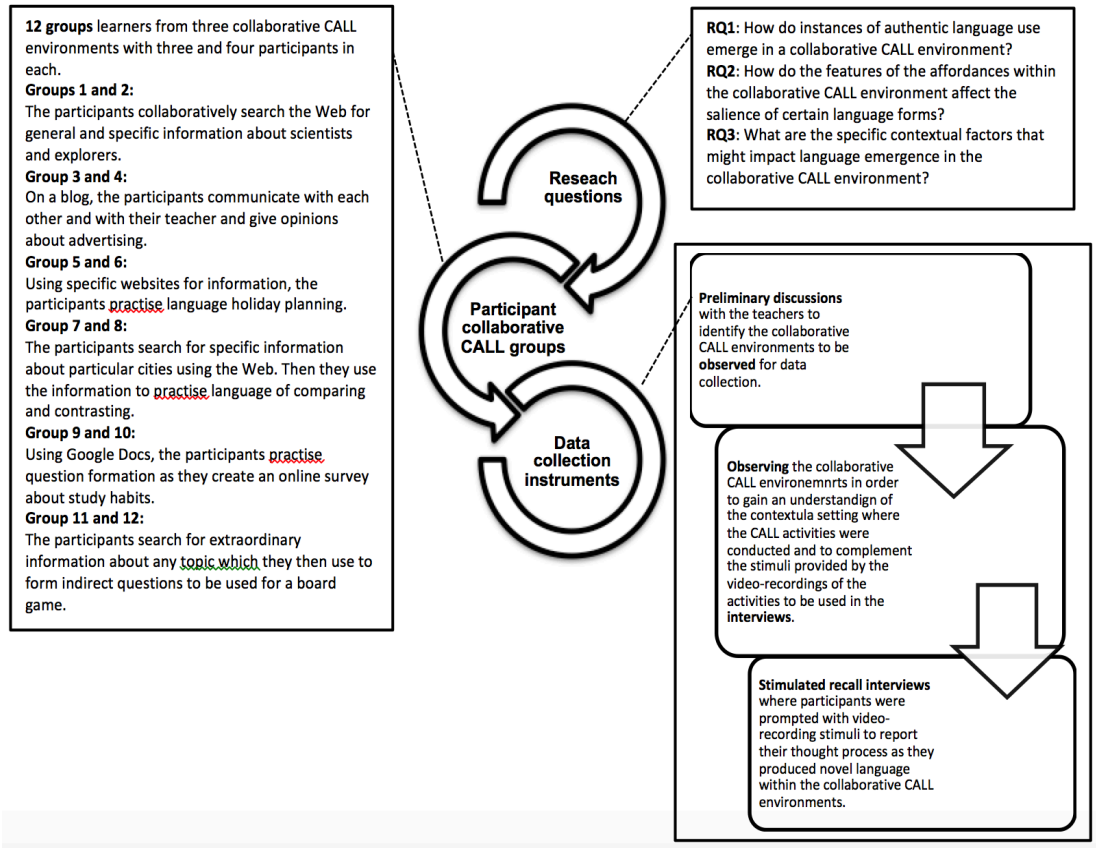

Diagram 4.3_ *Research questions, instruments and participants*

As illustrated in diagram 4.3, in this study 12 groups of learners within three collaborative CALL classes were selected to constitute the sources of data. Being a qualitative enquiry that is underpinned by the relativist approach, this study sought to explore that phenomenon with no hypothesis functioning as a coding frame for interpretation. Also, operating within the qualitative enquiry approach, this study accounted for factors within the macro-context (the classrooms) of the groups which involved addressing the ways in which the teacher's instructions, the inter- and intra-group interaction, and the physical space and its contents impacted the emergence of language use.

After identifying the three potential collaborative CALL classes, access was negotiated and informed consent was gained from the learners and class teachers. The selection criteria for the classes were mainly based on whether or not those classes had collaborative CALL activities as part of them. The three collaborative CALL classes were from the English language foundation programme in one of the Colleges of Applied Sciences in Oman. Data

collection was carried out in two phases with a time gap of two months between them. Investigating the phenomenon within 12 groups in three classes at two different points in time provided rich data as it was possible to compare results within and across classes. The aim of conducting class-by-class as well as group-by-group analysis was to achieve an illustrative description that accounts for commonalities and variations of the ways in which authentic language use emerges within and across the collaborative CALL environments.

Through preliminary discussions with the class teachers and observations of the classes, I was able to contextualise the phenomenon and the participants' responses in the VSRIs. The use of VSRIs as the primary instrument to collect data helped the participants to relive and reflect on some particular collaborative CALL situations that were of interest to me in this research as they related to the phenomenon under study. Video recordings of the collaborative CALL activities were used to provide the stimuli in the VSRIs in order to aid the participants to recall and report what happened in those situations of interest. The participants were interviewed in groups and they were shown episodes that contained such stimuli. In the interviews, I asked the participants questions that invited them to recall and describe their thinking processes that lay behind the ways in which they interacted in the collaborative CALL activities. The prompts used in the interviews were also intended to encourage the participants to report on why they were acting in certain ways and why they used particular language at specific points of the collaborative CALL activities.

The account of my positionality in this study not only showed where I stood in relation to the participants but also highlighted areas of concern regarding my theoretical stance and preconceived notions of the participants and the context. Being cautious about these aspects of my positionality is necessary to plan how best to deal with their consequences (Simeon, 2015) since the product of research is argued to be mediated through the researcher's positionality (Bourke, 2014). For instance, while collecting and analysing

data, I was conscious about the role of the theoretical framework in this study as one that is not meant to function as a coding frame or basis of hypotheses. Also, being funded by the ministry that foresees and governs the institution from where data for this study were collected, I strived to minimise any sense of coercion by following ethical procedures with regard to access and consent. By acknowledging my positionality in this study, I became aware of the ways in which I would engage with the process of data collection and analysis and I was able to foresee, address and minimise some possible biases of my own.

Chapter Five: Findings

5.1 Introduction

The findings from this study are presented and discussed in three sections within this chapter. This introductory section provides an overview of the collaborative CALL activities that the twelve groups from the three collaborative CALL environments worked on. Section Two of this chapter presents and analyses data that illustrate a process of how the participants constructed meaning within their groups in a way that involved emergence of particular language use instances. Section Three then presents an analysis of the data that relate to how the participants interacted with each other, the computer-based materials, printed materials, the teacher and learners in other groups as they worked towards completing the collaborative CALL activities. The data that illustrate the findings from the groups within the three classes are presented as extracts. In these extracts, the participants are referred to using the letters A, B, C and D to refer to the participants in order of appearance on the video-recordings of the VSRIs (with A being on the right). The letter R in these extracts stands for the researcher.

The collaborative CALL activities that the participants worked on in their groups within the three collaborative CALL environments varied in terms of the language learning objectives, provided by the teachers in the preliminary discussions, and in the technology used in each of them. As discussed in the Methodology chapter of this thesis, and illustrated by Diagram 4.1, I observed three collaborative CALL classes twice within one semester and interviewed two groups after each lesson. That is, I observed six collaborative CALL lessons and interviewed two groups from each. The following paragraphs provide an overview of the collaborative CALL activities that the twelve groups worked on. The information on these activities is presented here rather than in the Methodology chapter as it was gathered from the preliminary discussions with the teachers as well as from the observations. In addition, this information helps to contextualise the participants' language use within the collaborative CALL environments as

discussed within this chapter. Sample activity sheets are included in Appendices 7 and 8. In order to contextualise the findings, the activities on which the participants worked are briefly described below.

The collaborative CALL activity that Groups 1 and 2 worked on started with the teacher asking the students to think of two scientists and two explorers and what they did that made them famous. The teacher left it open for the students as to what online resources to use to find information. He asked them to use the Web to find the information they needed. The teacher also asked them to take notes of relevant information, and he also informed them that they would present their findings to the rest of the class at the end of the lesson. In this lesson, the students worked in self-selected groups of three or four. While working on the activity, the teacher moved around checking the students' work and attending to their questions. The overall aim of the lesson, as I learned from the preliminary discussion with the teacher prior to the lesson, was to train the students in searching the Web for general and specific information as a reading activity and to be able to orally present their web-search findings.

For the collaborative CALL activity that Groups 3 and 4 of Class 2 worked on, the teacher used a blog that he created specifically for lessons that would provide his students with opportunities to practise language previously taught. Before the lesson, the teacher uploaded images about commercial advertisements and above each image, he put the question, *for or against advertising?* That was the first thing the students saw when they opened the blog. As a whole group, they discussed the possible topics and issues presented by those images. Then they started answering the question for or against advertising by adding comments on the blog, and they also responded to each other's comments. Then the teacher chose three that he described as 'the best comments' and asked the students to work in groups to put them in one coherent paragraph. From discussions with the teacher prior to the lesson, it was revealed to me that one of the teacher's aims for using online blogs was to encourage his students to express their own opinions using opinion-expressing language they learned previously. The

blog gave the students equal opportunities - the same features, time and space - to participate.

The collaborative CALL activity in Class 3 (Groups 5 and 6) began by the teacher telling the students about how she had spent her weekend, and then she invited them to do the same. After that, the teacher asked the students to help her plan her coming holiday. To do so, the students were given a holiday-planning worksheet (Appendix 7) and were asked to use the Web to find information about a destination, hotels and entertainment. The teacher had previously told me that the purpose of that lesson was to give the participants practice in searching the Web for specific information as a reading activity and also to practise collaborative writing.

In the second collaborative CALL activity from Class 1, the students in Groups 7 and 8 were asked to do something similar to that which they had done in the first lesson. At the beginning of the lesson, the teacher wrote on the board names of some cities and asked students to group them into three or four categories based on common characteristics. In contrast to the first lesson, here they were asked to primarily use Google Maps and then if they needed more information, they could use any other webpage. From the discussion with the class teacher prior to the lesson, I learned that the aim of this lesson was to provide opportunities for the learners to practise the language of comparing and contrasting.

The second collaborative CALL activity from Class 2 (Groups 9 and 10) started with the teacher refreshing the students' knowledge about Google Docs, with which they had previously been made familiar, particularly with regard to creating questionnaires. Then the teacher introduced the activity of the lesson which was to produce a questionnaire about study habits using Google Docs. In small groups, the students discussed the questionnaire items that they would include. Then they individually created their own, each on his/her computer. When they finished, they sent their questionnaires to their teacher's email and to each other. They finished the lesson by

responding to the questionnaires they received from their classmates. The aim of this lesson was to practise what they had learned in the previous lesson about question formation.

The collaborative CALL activity that Groups 11 and 12 from Class 3 worked on was a follow-up on a previous lesson in which they had played a board game. In this lesson, the students were asked to create a board game. They worked in groups of three and four. They started by writing down some questions for their board games. They were asked to use specific websites such as the Guinness World Record Website to find information and then to write indirect questions about each piece of information they chose. By doing that activity, the teacher wanted students to practise using indirect questions in a fun way, as she explained to me.

5.2. Meaning-making process in collaborative CALL environments

The first major finding in this study related to the process of meaning making. A number of components were identified as contributing to this process, which are described and discussed in the paragraphs below. The multimodality of the process was identified as being particularly salient and is therefore discussed as a specific phenomenon. This section presents these findings within two categories and follows them with a discussion based on the results.

5.2.1. Textual components of the meaning-making process

The results from Group 2 of Class 1 showed that encountering a specific term that the participants already knew marked the start of the meaning-making process. For instance, in Extract 1 below, the textual mode was the primary source of information and the verb ‘establish’ seemed to play the role of a sign for the answer. To illustrate, as shown below, the word ‘establish’ made the participants think that they ‘would find something about his achievements’. The participants’ linguistic knowledge, ‘we knew it [establish]

was a verb', as well as the context of the text, helped them find the answer. That is, the participants linked the word 'establish' to achievements, since they had been asked to find out what the scientist had done to make him famous, and encountering 'establish' was followed by searching around it for what he achieved.

The text appeared to have elements that the participants immediately understood (e.g., establish) and others that were yet to be processed. Therefore, in going back and forth, as the extract illustrates, the participants were trying to fill the other elements of the text with meaning. It seemed that the meaning-making process in the following extract was constructed based on (1) the participants' knowledge of that text's context, 'his early life', and (2) the linguistic features they perceived from the cue 'establish', 'we knew it was a verb so it tells what he did'. Perceiving such linguistic features was aided by the participants' previous linguistic knowledge of 'establish', 'it was familiar … I came across it', and (3) on their search for more textual signs, 'going back and forth to find out what he did', which also helped them evaluate their own choices, 'to know if it was the sentence we needed or not'.

Extract 1
Group 2_Class 1

A: The word was there and we were not sure about it.

B: I think we saw it in the passage about his early life.

A: Yes yes, early life.

R: So what came into your mind when you saw the word 'establish'?

B: We would find something about his achievements.

B: And indeed it turned out to be one of his achievements. But I can't remember what it was now.

R: Good. So what did you do when you knew that?

A: We went back.

B: We went back to the beginning of the sentence to know if it was the sentence we needed or not.

B: And it was it indeed.

R: How did you know?

B: From the context of the sentence. It showed that it was something he achieved.

R: Did you know the meaning of 'establish'?

B: I sort of knew it.

A: it was familiar. I came across it.

B: We knew that it meant 'started' or 'designed' or 'founded'. We knew it was a verb so it tells what he did.

R: And was this what made you go back to the beginning of the passage?

A & B: Yes.

A similar meaning-making process is also found in Extract 2 below. The participants' familiarity with the verb 'develop' and their realisation that it was central to the overall meaning of the text ('"develop" was the word that made me think that it was what he did'), made them decide that the answer would be in or around that sentence. They then undertook a process of 'back and forth' reading in order to confirm their understanding of 'develop' and to establish the contextual meaning, 'to make sure that it was the right information and to know what the information was'. That process helped the participants obtain what they were looking for. As shown in Extract 2, in constructing the meaning of the text, the participants used a textual component, a verb which was familiar and perceived as a key element, as a starting point; then they established the overall meaning of the text by reading around that key element.

Extract 2
Group 2_Class 1

R: Right. But what made you [A] point at the screen. What did you see?

A: Because I knew she would not be able to see that.

B: No the information that made you point?

A: There was a word. I can't remember now. It meant that it was something he did.

B: 'Note'? No umm 'find out'.

A: Yes 'find out' I think. No No it was 'develop'

B: 'develop' yes

A: 'Develop' was the word that made me think that it was what he did.

R: What came into your mind when you read the word 'develop'?

A: When I read it, I felt it meant something that he made or changed, something like that.

R: Then you [B] read it out loud. What came into your mind at that moment?

B: I read it from the beginning to make sure that it was the right information and to know what the information was. When I read it I knew that it was the right information. He found out the theory of something.

In the previous two extracts, both 'establish' and 'develop' are action verbs and they are central to the meaning of the whole text (as the texts were about what those scientists did that made them famous, which was what the participants were trying to find). To attend to such verbs and to perceive them as central elements towards establishing meaning of the whole text shows how the participants initiated the processing of such texts. It also shows the interaction between external textual elements ('establish' and 'develop') and the resulting mental representations, such as *association*: 'develop was the word that made me think that it was what he did', *anticipation*: 'we would find something about his achievements' and *evaluation*: 'I read it from the beginning to make sure that it was the right information'. Such mental representations are illustrated in Extract 3.

Extract 3
Group 2_Class 1

R: So what came into your mind when you saw the word 'establish'?

B: We would find something about his achievements.

…

A: When I read it [develop], I felt it meant something that he made or changed, something like that.

However, the data also revealed that it was not only verbs that were involved in the processing of texts in that way. In Extract 4, the participants from Group 1 highlighted other central-to-meaning words, which included different content words.

Extract 4
Group 1_Class 1

A: We saw the main words we were looking for.

A: like his father, or anything like main words based on which we search.

B: It showed the date of birth and death

C: and discover

B: Yes and discover.

…

R: So these were clear on the screen?

B: Yes. And we were highlighting them in blue.

Extract 5 shows how the participants responded to a question from the teacher about a name of an island (i.e., a proper noun) that was on a Google Maps webpage that the participants were studying on their screens. As the extract illustrates, the students' immediate response to the question was to click on the name. That is, their response was an action that aimed to find the information the teacher was asking for. In the interview, the participants stated that the name of that island sounded familiar to them but they did not know where it was. To find out, they used the mouse and clicked on its name. One participant said that it helped her find the information that she was looking for and addressed the teacher's question.

Extract 5
Group 1_Class1

B: So we opened the map and saw the place. He [the teacher] asked us, is that in Oman?

A: It was very close to Musandam [One of Oman's provinces]. An island.

…

A: I heard about it but did not know where it was.

…

C: There was a lot of information. The place was not clear. I clicked on it and got the information about it.

…

C: We don't know a lot about islands. So I thought it would be small and like that.

While reading a text about an explorer trying to find out the specific information about what had made him famous, the participants reported that reading the word 'writer' in that text made them form an understanding that the person was not an explorer. As a result, they stopped reading that text and searched for the information they wanted on another website, as illustrated in Extract 6.

Extract 6
Group 2_Class1

B: Yes the word 'writer' was repeated frequently, which made us think that the person was not an explorer.

…

B: So we opened Wikipedia and we found it there.

…

R: You [B] have just mentioned that you saw words like 'writer' and 'writing', what did they make you think of?

B: We were trying to find out what he explored but we couldn't. It was all about his life being a writer and the like, so we decided to search in another place.

All these extracts above show the similarity of the process that the participants went through. In each case, the participants identified specific content words which they recognised to use as a 'key' to commence the process of unlocking meaning, of facilitating their comprehension of those texts. This process was purposeful, in that the construction of meaning using these linguistic clues was clearly linked to the information that they were trying to find out to address the question they had been set in the activity.

While the extracts presented above, all taken from Class 1, illustrate the use of key words as contributing to collaborative meaning-making, they all involved participant consensus on the meaning of those key words. An interaction within Group 3 in Class 2 demonstrated how participants managed to negotiate differences in their interpretations within the same process of using key words for meaning-making. To illustrate, Extract 7 below presents an interaction between two participants from Group 3 that led to negotiating the difference in meaning between 'buy' and 'sell'. In writing her comment on the blog's post, participant C used the verb 'buy' but when she heard B say 'sell', she thought that she had confused the meaning of the two verbs. Then she asked B to check her comment and see if she used the right verb. That is, the process of negotiating the difference in meaning between 'buy' and 'sell' took place after one participant doubted her initial understanding when she heard the antonym being used by her fellow group member.

What is also highlighted in Extract 7 is the social interaction between B and C that began with B being in doubt which made her seek assistance from C. Her doubt appeared to be initiated by the signal she received from hearing the word 'sell'. The reception of that signal and what followed it, from feeling in doubt to discussing it with a peer and going back and changing the answer, all took place within that collaborative CALL environment. In other words, this social interaction and collaboration took place within the collaborative CALL group and led to a mental function, C's (mis)understanding of the distinction between 'buy' and 'sell'. That is, this instance documents an affordance of an opportunity for meaning negotiation.

Extract 7
Group 3_Class 2

C: I wrote 'buy' and I meant 'sell'.

R: aha 'buy' and 'sell'. What happened that made you realise that?

C: I heard B say 'sell' so I knew that 'sell' was the word I needed not 'buy'.

R: So what were you saying to B?

C: I was checking if 'sell' was the correct word.

R: Do you [A] remember that point?

A: Yes, the same. I told her that 'buy' was incorrect. It should be 'sell'.

Looking at the exact comment that C put on the blog (below), It seems that 'buy' was the correct verb she needed, and that B's feedback led to inaccurate use of 'sell' and thus to not only confusing 'sell' with 'buy' but also to misunderstanding their meanings. The consequence of this discussion is illustrated in the extract from student C's blog below. The blog was:

Extract from Participant B's blog

B: yes I agree with you, In my opinion, I think the advertising is very important to effect in the people choices.

Teacher: Affect people choices? How?

B: It can attract the customer to buy product because it has a good quality.

B: sorry. I mean to sale [sic] not buy.

A further example of how key words played a part in the negotiation of meaning was identified in Group 5 of Class 3. In this case, as shown in Extract 8 below, the process of association was made because of the similarity of two words with different denotations. In their attempt to construct meaning, the participants in this group underwent a process that was initiated by encountering a word and guessing what it meant based on their previous linguistic knowledge. During the activity, the participants' goal was to select a high quality hotel that was not overly expensive. Extract 8 shows that as they read the details of one hotel they came across the term *taxes*. They understood *taxes* as *taxis* on the basis that the hotel offered taxis to guests. This was pointed out by one learner who read it out loud, calling the others' attention to it. He was not sure of what the word really meant, so he turned to his groupmates, and they agreed that it meant *taxis*. That discussion was very brief and consisted mostly of body language, as he turned to his groupmates saying *taxes* (pronouncing it as *taxis*) to which they responded nodding *taxis*. However, it was clear that after the class they were still having

doubts about what it meant, because they asked me in the stimulated recall interview about what 'taxes' actually means.

Extract 8 indicates that the participants' use of context to understand the meaning of *taxes* was rather counterproductive. As they were reading about what a hotel offers on a hotel-booking website, they stopped reading to discuss the meaning of 'taxes'. When B turned to the other group members pronouncing 'taxes' as 'taxis', they agreed that it meant 'taxis'. This extract shows that the word 'taxes' was unknown to the participants, so they did not confuse 'taxes' with 'taxis', but they thought it must be the same word. Nonetheless, this indicates a process that those participants followed in order to understand a word that they did not know. That process seemed to involve the participants' previous linguistic knowledge (meaning of taxis) through association, the use of context (a list of what a hotel offers) and the consideration of the activity's goal (finding a high-quality hotel to stay in).

Extract 8
Group 5_Class3

B: We were looking for the quality. We were trying to find the best hotel to stay in. Then we found this offer.
R: Why were you saying 'taxes' out loud? What was in your mind?
B: I did not know its meaning.
A: We kind of agreed that it meant 'taxis'. We were and still are not sure about it.
R: Did you write it down?
B: Yes we did.
R: You wrote it down thinking that it meant 'taxis'?
A: Yes. [to R] It does not mean 'taxis', does it?
R: No, it means 'thara'ib' [in Arabic].
R: What about you [C], what were you thinking when they were talking about the word 'taxes'?
C: The same thing.

5.2.2. Multimodality in meaning making

While Section 5.2.1 above focused on the textual elements that contributed to the meaning-making process, it was clear that this was not the only way in which participants constructed meaning. The multimodality inherent to CALL environments also played an important role. Extract 9 below illustrates how the participants from Groups 1 and 8 of Class 1 used materials that provided them with texts and images simultaneously, in this case on the topic of 'Marie Curie'. The participants stated that images of Marie Curie stimulated their background knowledge and helped them remember some information about her. Before they started reading the text about Marie Curie, the participants already knew her name and what she had discovered, which what the activity was mainly about.

Extract 9
Group 1_Class 1

> *A: This was when I saw Marie Curie. I saw her name and I pointed at her saying this is what we will choose.*
> *R: Why?*
> *B: Because we know about her.*
> *…*
> *A: When we saw Marie Curie, we remembered her and what she explored and that her exploration was the reason for her fame. This was among the reasons we chose her.*
> *B: She was the one that caught our attention among the others because we knew more about her.*

The source of information that the participants had to use in that lesson was not specified in the teacher's instructions. However, Group 8 had been advised by the teacher in their class that for their activity of identifying commonalities between cities that they should primarily make use of Google Maps. However, when the group could not find common information between a group of three cities using texts on webpages, they used images as their primary source of information. Looking at the images of one city, the

participants identified that that city was historic. Then they sought out images of the other two cities to check if they were historic as well. The data in Extract 10 show that the use of the visual mode only, without referring to any text, helped the participants to find the information they wanted.

The participants used the visual mode in two different ways. First, by studying the image of the first city, the participants used it to help them identify a characteristic that might be shared by the other two, and decided that a possible common characteristic was that they were historic. Second, they clicked on images of the other two cities to check 'if they [the other two cities] have history', as B stated (Extract 10a). That is, the first use of the visual mode helped the participants anticipate a possible answer which was followed by checking that possibility using the same mode.

Extract 10a
Group 8_Class 1

R: Here you were thinking about what was in common between three cities; then you started saying 'history'. What were you thinking?

B: I think that was because of the images. We were looking at the images of those cities.

…

A: I think we couldn't find anything about one of the cities and then, looking at the images, we thought history could be what's in common between them.

R: Those images were all of one city, right?

B: Yes.

R: So what about the other cities in common with that city?

B: We did the same. We looked at the images of two more cities to see if they have history.

R: Here you got into a discussion about New Delhi? What happened?

A: We saw images of huge statues in New Delhi.

R: And did that make you think about including it under 'history' with the other cities?

A & B: Yes.

However, in the situation presented in Extracts 10a and 10b, the teacher insisted that they stop using images and use Google Maps instead. The participants expressed reluctance to use Google Maps as instructed, as I noted from the observations and from the video-recordings. The reason, as they reported, was because they were not convinced that Google Maps would help them find the answers they wanted, 'R: Why didn't you use Google maps although the teacher suggested it? A: We were not convinced that it would help'. Their previous experience working on a similar activity with that teacher also contributed to that reluctance as A added:

Extract 10b
Group 8_Class 1

A: Also, in the previous lesson we did something similar. We were asked to find what was in common between three countries. And the answer was the letter "L"! So we thought the answer could be something like that again.

R: So was this the reason you did not use Google maps?

A: Yes. He always tries to trick us, so we thought we would not fall into it again.

Expressing that they were not convinced that using Google Maps would help them find the answers shows that the participants evaluated the efficacy of using that Web-based application against the information they were asked to find (what was in common between three cities). However, the teacher insisted that they should use Google Maps. And forced them to do this by closing all the windows they were looking at and leaving them with a Google Maps page to use, as revealed in Extract 11:

Extract 11
Group 8_Class 1

A: He used Google maps and then told us to use Google maps only.

R: Did he show you something to prove his point?

B: No. He even closed all the windows of the images that we opened.

R: So when he used the mouse, he was closing the windows you opened and not showing you something about New Delhi?

B: Yes he closed all of them and opened Google maps only!

R: Right. What did you think about then? What did you do?

B: We put the names of cities left on Google maps, and A noticed that they were all in China.

The participants then used Google Maps as instructed. In using Google Maps, they incorporated the use of visual and textual materials to support their understanding, as shown in Extract 12.

Extract 12
Group 8_Class 1

R: Right but what did he do on the computer to tell you that?

A: He used Google maps and then told us to use Google maps only.

…

B: We did use it [Google maps] in the beginning?

R: What for?

B: Only to find the location of the cities. Then we started using Wikipedia to find more information.

In another group (Group 5, Class 3), participants studied materials that contained map images and text. The extract below shows that when the participants were asked to find general information about the destination that they chose, they started by looking at the map where their destination was located, and then they used information from a box next to the map. One student spotted general information listed in that box, and he drew the others' attention to it. That is, it seems that both image and text were used in a

complementary way to help the participants make meaning of what was on the screen, and hence selected that information, as Extract 13 illustrates.

Extract 13
Group 5_Class 3

B: There was something like general information …

C: Yes there was like a box that had information about the city. So she was suggesting that we read what's in the box [not only look at the map].

R: What made you [B] suggest that?

B: Because they give us general information about the city like the economy, population, etc.

R: Where?

B: On Google maps itself.

R: Did you find what you were looking for?

B: Yes we did. We found some useful information.

C: Yes especially information about the weather of each city.

Group 11 in Class 3 also undertook the same activity. The data from that group revealed that an image on a webpage could also play another role. While the previous extract from Group 5 shows that visuals being within a text on a webpage supported overall comprehension, in Group 11 one participant stated that an image attracted his attention and made him read the accompanying text. As the participant stated, because he liked the image, he read the text associated with it and disregarded the other texts on that webpage, as shown in Extract 14.

Extract 14
Group 11_ Class 3

R: Why did you choose this particular information?

C: Well I liked the image.

…

C: It was an image of someone on a scooter. It was clear that he was moving fast?

B: I think it was 95 K/h.

R: What were the other things on that page besides the scooter image?

C: Something about the motorcycles and bicycles.

R: You did not like any of those?

C: No. The scooter caught my attention.

5.2.3. Analysis

The results presented in this chapter so far show that the participants exhibited commonalities as well as variations in the ways they interacted in each class. These commonalities and variations are grouped below into two categories that relate to language emergence in collaborative CALL. They are: (1) mechanisms involved in the process of meaning making, and (2) ways of working with multimodal materials. In combination, these two areas address the role of attention in language emergence, language salience, and the contextual factors in collaborative CALL environments that influence language emergence.

5.2.3.1. Meaning-making mechanisms in collaborative CALL environments

While the participants from Group 2 were trying to understand the text, textual cues like 'establish' (Extract 1) and 'develop' (Extract 2) linked what the participants already knew, 'B: I sort of knew it. A: it was familiar', to what they wanted to find out. The perception of those links made the participants pay more attention to those cues ('establish' and 'develop'), '"Develop" was the word that made me think that it was what he did… B: It [establish] was written. So we were going back and forth to find out what he did' (as in Extract 1). As discussed earlier, this suggests that the participants voluntarily paid attention to 'develop' and 'establish' after they recognised their relevance to what they were trying to achieve. Perceiving such links is considered to be a process of signalling relevance between linguistic cues and the learners' goals. Signalling relevance is a process that could result in meaning making (as in van Lier, 2004). Therefore, signalling relevance in collaborative CALL environments seemed to precede attending to those

cues. What the participants attended to from the collaborative CALL environment appeared to be based on the relevance being signalled by those cues, which also depended on what the learners were doing/trying to do.

Furthermore, the participants' linguistic and background knowledge (e.g., of 'Musandam', 'Hurmuz', in Extract 5 or 'establish' in Extract 1) seemed to give them additional capacity to explore more those learning opportunities in the collaborative CALL environments. For instance, the 'perceived property' (Norman, 1988; cited in Burlamaqui & Dong, 2015) of 'establish' in that collaborative CALL learning opportunity was as 'started or designed or founded' because they knew 'it was a verb so it tells what he did'. Also, such collaborative CALL learning opportunities were made possible because 'establish … was familiar' and 'Hurmuz … was very close to Musandam [a Provence of the participants' own country]'. That is, 'writer' (Extract 6), 'Hurmuz' (Extract 5), 'develop' (Extract 2) and 'establish' (Extract 1) were linguistic resources whose meaning became a matter of choice by the participants (as in Jewitt, 2014); a choice that seems to be based on the participants' prior knowledge. In addition, to be perceived as relevant seemed to be what helped the learners treat them as central elements to meaning in those contexts, as noted above. That is, the learners' background linguistic knowledge, of e.g., 'develop' and 'establish', facilitated the emergence of that language use opportunity within the collaborative CALL environment because they enabled the signalling of relevance to take place.

A similar process was identified in the results from Group 3 when one participant was trying to write a comment on the blog responding to the teacher's blog post about advertising (Extract 7), and she stopped to ask one of her peers within the group about the word 'sell' that she heard her utter. As this participant explained in the VSRI, she stopped to ask because she 'knew that *sell* was the word [she] needed not *buy*'. This again indicates that this participant attended to that cue because it was perceived as relevant to what she needed in order to write her comment in her blog. Similarly, the results from Group 5 (Extract 8), show that the participants attended to the textual

cue ‘taxes’ as they were looking for a hotel of high quality, and they deduced that the hotel in question must offer taxis to its guests.

However, unlike the cases of ‘establish’ and ‘writer’, the signalling of relevance in the cases of ‘sell’ and ‘taxes’ was negative; it resulted in creating a faulty link between the goal and the perceived cue. For example, the confusion in the meaning between ‘sell’ and ‘buy’ (Extract 7) and between ‘taxes’ and ‘taxis’ (Extract 8) seemed to be what fuelled the incorrect perception of the link between what the learners wanted to find out and the meaning of those words. In both situations, the further action (asking a peer about the meaning of ‘sell’ and saying ‘taxes/taxis’ out loud) was followed by an evaluation stage that was dialogic, ‘I told her that *buy* was incorrect. It should be *sell*’ and ‘we kind of agreed that it meant *taxis*’. When evaluated negatively, e.g., ‘*buy* was incorrect’, the process started again as the student perceived the cue ‘sell’ as relevant to what she wanted to write. When evaluated positively through mutual agreement as to the meaning, e.g., ‘it meant “taxis”’, they moved on to the next step of the activity. These two instances indicate that what made the construction of language use affordances positive or negative (i.e., cyclic or non-cyclic) was that last stage, evaluation.

Moreover, since mediation is the use of tools from the environment in order to make meaning (Ahn, 2016; Peng, 2011; van Lier, 2004), the results from the groups in this study show that the mediating tools in the collaborative CALL environment were both language-based and non-language-based. For example, textual cues, such as ‘writer’ and ‘develop’ and auditory cues like ‘sell’, assisted the participants to find out why those scientists and explorers were famous. Another mediating tool that the participants used was the kinaesthetic interaction of pointing at specific elements on the screen (e.g., Extracts 1 and 2). A screenshot of this interaction is provided in Appendix 9.

The discussion above demonstrates that one way the participants constructed meaning in the collaborative CALL environment was through a process that started by signalling relevance followed by a further action and then evaluation. This process is summarised, using the examples presented in the earlier paragraphs, in Table 5.1 below.

Extract example	Signalling relevance			Action	Evaluation
	Cue	*Perception*	*Fuelled by*	*Checking*	*Confirmation*
	Stimulator	A possible link between the goal and the cue	Background knowledge	the perceived possible link via reviewing the text	of the perceived link
1	Establish	We would find something about his achievements	It was familiar. I came across it … We knew it was a verb so it tells what he did.	We went back to the beginning of the sentence to know if it was the sentence we needed or not.	And it was it indeed. … From the context of the sentence.
2	Develop	When I read it, I felt it meant something that he made or changed	There was a word … It meant that it was something he did.	I read it from the beginning to make sure that it was the right information	When I read it I knew that it was the right information
5	Musandam	we opened the map and saw the place … It was very close to Musandam	I heard about it but did not know where it was	I clicked on the map. To find out if it was An Arab land or not	The place was not clear. I clicked on and got the information about it
6	Writer	think that the person was not an explorer'	It was all about his life being a writer and the like [background knowledge of 'writer']	So we decided to search in another place. We opened Wikipedia	we found it there

***Table 5.1**_Components within the process of language emergence*

This table shows a process of constructing affordances for authentic language use in which the participants used the resources available to them in the collaborative CALL environment. By constructing those language use affordances, the participants became involved in a process of meaning making that took them through signalling relevance, action and evaluation. These elements of the meaning-making process in the collaborative CALL environment are discussed further in the following sections.

5.2.3.1.1. Elements of the meaning-making process in collaborative CALL environments

As presented above, the results of this study indicated that meaning in collaborative CALL environments was constructed through a process that began by the participants establishing a link between a specific cue in the collaborative CALL environment followed by an action in order to achieve a goal. That link was established based on the participants' existing (linguistic) knowledge of that cue and on their perception of how it related to the information they wanted to obtain. This result extends findings from previous studies (e.g., Burlamaqui & Dong, 2015) where the role of the learners' previous linguistic knowledge was emphasised as part of the meaning-making process. The current study adds that the learners' prior linguistic knowledge facilitates the process of meaning making by enabling the learners to identify a key element that can start the process. This suggests that meaning in collaborative CALL environments is constructed based on the learners' ability to establish a link between a cue in the collaborative CALL environment and the goal they want to achieve. The establishing of such a link is facilitated by the learners' prior linguistic knowledge and by their understanding of the activity requirement.

In this study, those cues that the participants linked to the information they wanted to find were keywords in Web-based texts. Identifying those key elements was followed by the action of reading around those central elements in order to confirm the link between that central element and the information being sought. This process aligns with the so-called *reading path*

(Kress, 2003; Kress & van Leeuwen, 2006) by which learners identify an element as central and others as marginal, and to make meaning, they move from the centre (what they know and relate to the information sought) to the margin (yet to be filled with meaning). This identified process indicates that the elements of the meaning-making process in the collaborative CALL environments were (1) the participants' perception of those cues as central, (2) the further action they undertook in order to achieve (3) a goal. This accords with the findings from previous studies (e.g., Burlamaqui & Dong, 2015; Thoms, 2014; Zheng et al, 2009), where it was suggested that it is the interconnected relationship between such elements that helps learners construct meaning in a language activity. Thus, the complementary relation of these identified elements was what fostered the construction of meaning in collaborative CALL environments. The concept of 'complementary interconnected relation' is used in CT literature to describe how language develops – that is, as "a system of relations rather than a collection of objects" (van Lier, 2004, p. 5) that operates at a number of different, but interconnected, levels (Larsen-Freeman, 2011). For the emergence of language use, the participants' perception of those cues as central and the consequent actions and evaluation that followed could be viewed as integral (relational) components within the process of language development.

Moreover, perceiving cues as central elements and following that up with a further action is a situation that affords opportunities for meaning making. This aligns with the description of learning affordances as the 'relations of possibility' that provide learners with opportunities for action in order to achieve certain goals (van Lier, 2000; 2004). Because the construct of affordances ''recognizes that language learning is not an isolated activity within the implicit causality of input and output'' (Thoms, 2014, p. 727), this highlights the significance of the learners' involvement in the construction of the language learning affordances in collaborative CALL environments. That is, the learners' involvement in the collaborative CALL activities along with their interaction with the materials used in the collaborative CALL environments, with their peers and/or with the teacher was what promoted the construction of language use affordances. This result provides support

for the present study's emphasis on affordances, which suggests that affordances of authentic language use are constructed by the learner responding to cues from the collaborative CALL environment - they do not exist independently.

5.2.3.1.2. Perception and the role of attention in collaborative CALL environments

In collaborative CALL activities, perception seems to be the learners' active creation of links between linguistic cues from the collaborative CALL environment and the purpose of the collaborative CALL activity. Having in mind a purpose (e.g., finding out why a scientist was famous or what made a hotel of a high quality) while processing texts created a match, or link, between cues in the collaborative CALL environment (e.g., Extracts 1, 5, 8 and 13) and what the actively involved learners were trying to do. That is, what the participants perceived was that there was a match. This result suggests that what is being attended to depends on whether or not a match is perceived. When no match was perceived, i.e., no relevance was signalled, the participants started the search to obtain information again. That is, signalling irrelevance played the same role as signalling relevance in that they both initiated a process of meaning making. While this interpretation emphasises the role of being involved actively in enhancing attention to specific cues in a learning environment like collaborative CALL, which aligns with what has been suggested by other studies (e.g., Ahn, 2016; Peng, 2011; van Lier, 2000; 2004), it also suggests that what guides the attention of the actively involved learners is that perceived match (e.g., Table 5.1). The recognition of the possibility of that matching relation triggered the learners' perception and called for a further action, i.e., a process of constructing an affordance of language use. This interpretation offers a different perspective to view the concept of orientation from that discussed in the literature. As discussed earlier in 3.3.2.1, the concept of orientation has been viewed as the attentional mechanism of committing attentional resources to stimuli. The findings in this study emphasise what learners do in terms of recognising matching relations – or relevance - between cues in the environment and their goals (illustrating a bottom-up process in collaborative CALL

environments) rather than features of the stimuli within the collaborative CALL environment.

5.2.3.1.3. Signalling relevance within collaborative CALL environments

Signalling relevance in collaborative CALL environments appeared to be similar to what has been referred to as first-level affordances (van Lier, 2004) and to what is called the basic-level of recognition (Bar, 2009). As has been shown by the results in this section, signalling relevance is similar to those two terms as it could be the trigger of the learners' focal attention. The relevance of 'establish', for instance, could have been signalled via analogy as the case in the basic-level of recognition. Because analogy, as a cognitive tool, is about linking cues from the environment to similar representations in the learners' linguistic background, it allowed those participants to use the associated information towards predictions and expectations of what the answer would be.

Signalling relevance is also similar to first level affordances and the basic level of recognition as it appears to be mediated by a range of mediating tools. Since mediation in the process of meaning making is the use of contextual tools from the environment in order to make meaning (Ahn, 2016; Peng, 2011; van Lier, 2004), in the collaborative CALL environment such tools could be both linguistic and non-linguistic. For instance, textual (as in Extracts 1, 3 and 6), auditory (Extract 7) and/or visual (Extract 9) cues facilitated obtaining information. Additionally, the results also show that the process of meaning making in collaborative CALL environments involved the use of gesture (e.g., Extracts 2, 5, 7 and 8). Previous studies have also found that gesture is a part of the co-construction of sense making in a context of L2 classroom (Belhiah, 2013; Eskildsen & Wagner, 2015; Lan et, 2015). The employment of these linguistic and non-linguistic mediating tools shows that language emergence in the collaborative CALL environment was context dependant which is a view that aligns with the terms of embodied language processing. According to studies in this area, language learning occurs both inside the head of the learner and in the world in which the learner is

engaged actively (Cowart, 2004; Lan et al, 2015). This position concerning language learning emphasises the significance of the collaborative CALL environment in which the learners had opportunities to interact, physically and cognitively, with each other and with the world, providing the participants with embodied learning experiences.

Furthermore, the signalling of relevance in the collaborative CALL environment was immediate and direct (e.g., Extracts 5, 6 and 7). What this immediacy of the perception of relevance could mean, which could be also considered a condition for perception in the collaborative CALL environment, is that the learners had access to and were actively engaged in that activity, and that the collaborative CALL environment was the context for that perceptual match. This underscores the role of the learner as the agent in the collaborative CALL environment. Previous studies have suggested that the learners' engagement in a language learning activity can be a ''demonstration of the learner's conscious efforts to create opportunities for learning'' (Ahn, 2016, p. 164). This positions the learners' engagement at the heart of constructing affordances for the emergence of language use.

However, immediacy does not mean that the learners matched a cue from the collaborative CALL environment to what they wanted to find out (e.g., 'writer' to 'not being an explorer' in Extract 6) with no similar pre-existing mental representations. The learners' prior knowledge of the attended-to cue could have been a *pre-sign* that fuelled the establishing of the match between the cue and the information being sought, the *sign-making* (as in van Lier, 2004). This result highlights, again, the role of the learner's prior linguistic knowledge in enhancing what they attend to in the process of meaning making, which accords with the view that attention as a cognitive construct depends on the particular perceptual and motor capabilities of the agent (Thelen, Schöner, Scheier, & Smith, 2001). Also, the learners' linguistic knowledge (as in Extracts 1, 2, 5 and 6) seemed to give them an additional capacity to explore the affordances in those collaborative CALL learning opportunities. Previous studies have suggested that prior knowledge

expands the capacity of discovering the affordances from an environment where the agents are actively involved (e.g., Burlamaqui & Dong, 2015; McGrenere & Ho, 2000). That is, the learners' background knowledge of the textual, auditory and/or visual cues facilitated the emergence of language use opportunities because through them the process of signalling of relevance was enabled to take place.

5.2.3.2. Multimodality in activities conducted within collaborative CALL environments

The data from the groups in all three collaborative CALL classes show that textual, auditory, and visual cues played a role in the process of meaning making. For instance, while trying to select an answer, a portrait that was on a website caught the participants' attention (Extracts 9) because it was of Marie Curie, a person who they not only recognised but about whom they also remembered some information that was relevant to the activity requirement. That is, that image activated the participants' background knowledge. Similarly, as shown in Extract 14, the participants in Group 11 were browsing the Web trying to select an answer when one participant started pointing at the screen suggesting to his peers that they write a question about that information he was pointing at. When asked about what happened, he replied 'I liked the image … the scooter caught my attention' (Extract 14), screenshot in appendix 10. In both instances, after paying more attention to those images, the participants read the texts associated with those images in order to find out more.

These two instances show two different ways in which the participants related to the images they encountered. While in Group 1, paying close attention to the image of Marie Curie was based on the participants' previous knowledge, the image of the scooter received particular attention because of what it depicted, which was interesting and exciting to that participant. That is, images in the collaborative CALL environment, played a similar role to that of the textual and auditory cues in facilitating the process of signalling relevance, despite the different ways the participants related to them.

These results show that meaning in the collaborative CALL environment is constructed through an on-going complex interactional process between the learners (with all their prior knowledge, interests, motivation, competences, etc) and the language learning resources/materials, which can include images, texts, the teacher and other learners. Images, for instance, in the collaborative CALL environment played a role in meaning making as it appeared that they had an effect on fostering the participants' comprehension. For example, the results from the current study revealed that while browsing multimodal reading material (such as a Wikipedia webpage), the participants went back and forth between text and images (e.g., Extracts 1, 5, 6, 9 and 13). The process of going back and forth between the images and text, which also involved discussions with peers and/or the tutor, reflects the participants' active engagement in the collaborative CALL environment. While this finding illustrates another instance of embodied cognition, it also highlights the reciprocal and recurring nature of the interaction between the participants and the collaborative CALL environment. Within CT, this can be described as a process of continuous coupling between the organism (the learner) and its environment, discussed earlier in 3.2.1 – a description that has been used to explain the complex and non-linear process of language emergence (Thelen & Smith, 1994). For the current study, therefore, this kind of reciprocal and recurring interaction indicates that the process of language emergence in a collaborative CALL environment is a complex process that involves a number of embodied cognition mechanisms. The outcome of these mechanisms together makes up one form of the language emergence process in the collaborative CALL environment.

Activities that occur in collaborative CALL environments, where images are used as clues to understand a reading text, have been referred to as active supported image pedagogy (Wang, Lawson & Curtis, 2015). Studies on active supported image pedagogy have shown that it not only facilitates learners' comprehension but can also promote their curiosity, attentiveness, and motivation to read (Hibbing & Rankin-Erickson, 2003; Mason, Tornatora & Pluchino, 2013; Risko et al, 2011). Just like the textual cues, images

triggered the learners' focal attention by activating their prior knowledge and by facilitating the signalling of relevance (to what they needed to find out).

Moreover, the multimodal reading process in the collaborative CALL environments was undertaken by learners in an individual, self-regulated and complex way, for example, reading, rereading, pointing, using the mouse to zoom in and out, discussing with a partner, asking the teacher, and overhearing other groups. Studies on how learners self-regulate have similarly shown that skilled readers become involved in a reading process where they set goals, read, reread, and monitor progress (e.g., Horner & Shewry, 2002). Also, the results from the current study show that, in addition to the cognitive strategies of self-regulated reading, the participants pointed frequently at the screen, gestured, and overheard other learners (e.g., Extracts 2, 9, 8 and 14). This suggests that reading multimodal materials in a collaborative CALL environment provides learners with an opportunity to combine cognitive strategies (e.g., attentiveness and alertness) with physical reading-related actions (pointing, clicking mouse/ using keyboard) in order to construct meaning. In the collaborative CALL environment, the main purpose of the physical reading-related actions was to share and suggest what was relevant. This process of intertwining physical and cognitive processes in the collaborative CALL environment has also been identified in a previous study that investigated the nature of online reading tasks (Coiro & Dobler, 2007). As suggested by studies of embodied cognition (e.g., Cowart, 2004; Eskildsen & Wagner, 2015), these behaviours, such as pointing, gesturing, or taking turns are resources that language learners draw on to construct understanding in an ongoing way. This lends more support to the argument of integrated embodied cognitions in the process of meaning making in the collaborative CALL environment and also to how the current study views language use affordances; namely, as being constructed in the environment of collaborative CALL.

In reading collaborative CALL multimodal texts, prior knowledge stimulated by image depictions helped the learners to access and locate information

more easily. Accessing information based on one's own prior knowledge is believed to result in a better comprehension of the reading material (Burlamaqui & Dong, 2015; Chan & Unsworth, 2011). However, considering that image is open to a variety of possible meanings (Kress & van Leeuwen, 2006), it seems that the participants based on their prior knowledge attended to cues in the images that seemed to support their prior-knowledge-based ideas and expectations. This also influenced the way they approached and processed the texts associated with the images (e.g., Extracts 9, 10 and 14). This is to say that meaning was not in the images, but it was constructed by the participants processing the depictions of the images. In other words, the images triggered the meaning-making process by facilitating the activation of the participants' prior knowledge, followed by the initiation of prediction, which the participants then confirmed or rejected by reading the text. It has been argued that proficient readers integrate their previous knowledge and make predictions as they read, as in Yeh et al, (2016). It can be understood from this argument and the findings discussed here that the participants engaged with the multimodal reading materials according to their own interests, not according to the way the materials were designed. This interpretation aligns with the modular view of navigation where the message is redesigned by the learner who engages with the modular ensemble - of different modes - materials (Kress, 2015). This again supports that reading multimodally within a collaborative CALL environment is processed in an individual, self-regulated and dynamic way.

The results indicate that the use of images - in conjunction with the text - in the collaborative CALL environment had an effect on the reading process in two complementary ways. The first way was by activating prior knowledge and signalling relevance (that could facilitate perception as discussed above). For example, when participants in Group 1 encountered the image of Marie Curie, their prior knowledge was activated via two 'projective processes' (as explained in Kress & van Leeuwen, 2006). One projective process was the process of perception which, as discussed earlier, started with signalling relevance to what the learners wanted to find out, e.g., 'we remembered her', which facilitated the learners' focal attention, 'she was the

one that caught our attention' (Extract 9). The second projective process that activated the learners' prior knowledge was the cognition process as the learners knew of Marie Curie and knew what she had discovered that made her famous. The two projective processes were complementary as together both aided the participants to establish meaning. That is, the projective process of perception facilitated attending to the image cue, e.g., that that figure was Marie Curie, and then the projective process of cognition stimulated their memory, e.g., helped them remember what they knew about her.

Another way in which the reading process in a multimodal activity within a collaborative CALL environment was affected was by involving the participants in a process of 'psychocognition', a term used in this study to refer to a combination of the mental processes (e.g., perception) and relational processes (e.g., feelings, liking) that are involved in the process of making sense of multimodal materials, as introduced by Halliday (2004). As occurred in Group 11, an image of someone on an electric scooter attracted one of the participants' attention. There is no indication of any relevance to what they wanted to find being signalled by that image, but it still caught the learner's attention. Thus, that image attracted the participant's attention for a different reason than that of the image of Marie Curie. It attracted the learner's attention, which was a mental process, not because they knew the person on that scooter or the story behind that image, but because the image representation seemed to be exciting and interesting to the learner, which was a relational process. This adds a third projective process that gave primacy to the participants' feelings, interests and excitement in influencing what they attended to while working on a multimodal collaborative CALL activity.

In both images, the image representation seemed to be arranged by the participants. What the images depicted depended on that arrangement which was unique as it was influenced by what processes the participant would activate, i.e., one or both of the two processes of projection and/or the

process of psychocognition. Images in collaborative CALL activities, in short, facilitated the construction of meaning based on the participants' prior knowledge and by creating links to their unique interests.

One disadvantage of the multimodal environment in this study was the participants' tendency to become over-dependant on using images when trying to achieve their goals. It was a disadvantage as it sometimes led to tension and confusion among the participants. For example, the participants in Group 8 insisted that 'New Delhi' was an old city because they found images of statues and sculptures when they looked it up on Google. In that situation, what the participants failed to do was to use the text in a complementary way, and hence they missed one element in constructing the overall meaning in multimodal learning environments. In multimodality, meaning is the result of the semiotic work of how the materials are designed and of the 'subsequent semiotic work of interpretation' by the agents (Kress, 2015, p. 57). The reason for this overdependence in this particular instance was that the participants wanted to follow the same strategy of using images only which they had used to make choices in the previous part of the activity. Hence, these participants failed to go beyond their individual modal habits and preferences which is a skill needed in order to work effectively in multimodal interactive situations such as those that occur within collaborative CALL environments, as found in previous studies such as that by Guichon & Cohen (2016). That is, these participants restricted and limited themselves to one mode despite having the opportunity to use other modes. This shows that collaborative CALL activities can become a monomodal activity through the participants' interests and preferences, and hence veer away from the multimodal essence of collaborative CALL activities that occur within CALL environments.

In summary, the discussion above argues that one way the participants constructed meaning in the collaborative CALL environment was through a process that started by signalling relevance followed by a further action and then evaluation, as shown in Table 5.1. The results showed that when the

match between a cue in the collaborative CALL environment and the information being sought was confirmed, the information was obtained. When it was not confirmed, the process of meaning making started over again. That is, meaning making in the collaborative CALL environment is a process of signalling relevance, action and evaluation. The process of meaning construction in the collaborative CALL environment was influenced by the multimodal nature of the activities. Visual, textual and auditory cues in the collaborative CALL environment influenced the process of meaning making by activating the participants' prior knowledge and/or by aiding them to create links to their own interests. Within the collaborative CALL environment, meaning was constructed through a complex and self-regulated interactional process between the learners and their prior knowledge, interests, motivation, and language competences, and the language learning resources available, which included printed and electronic materials, the teacher and other learners. However, the participants' personal preferences also led participants to over-rely on a single mode to work with in the collaborative CALL activity, which could lead to missing aspects of the process of meaning-making when meaning is distributed across different modes.

5.3. Learning strategies in collaborative CALL environments

In carrying out the collaborative CALL activities, the participants from the 12 groups purposefully acted in certain ways which helped them obtain information and complete the activities. As discussed in Section 2.2.6 of the literature review in this thesis, the employment of learning strategies in Web-based language activities influences the ways in which learners interact with the materials and with each other to achieve their aims within the CALL activity. Strategies in the current study are defined as ‘‘any organised, purposeful and regulated line of action chosen by an individual to carry out a task’’ (Common European Framework of Reference for Languages, 2001), while the ways in which the participants applied those strategies are described as ‘techniques’. The following sections (5.3.1, 5.3.2 and 5.3.3) explain the learning strategies that the participants from the 12 groups

employed. The results are organised into four categories of learning strategies which are presented by class. Section 5.3.4 then presents an analysis of these results.

5.3.1. Strategies within Class 1

As the participants from the four groups within Class 1 worked on the collaborative CALL activity, four different learning strategies were identified. Those strategies related to how the participants searched for information (search strategy), selected answers (selection strategy), offered and/or sought assistance (assistance seeking/offering), and the way in which they completed the activity, each of which is described in more detail below.

5.3.1.1. Search strategy

The data from the groups within Class 1 show that in searching for information, the participants employed a number of search techniques in order to obtain the information they wanted. As presented below, the participants purposefully, in the sense of being goal-oriented, used generic terms in some instances and specific keywords in others. The employment of each of these techniques was associated with whether the participants wanted to identify a list of options or find a specific piece of information.

5.3.1.1.1. Using generic terms

To obtain information, the participants entered general terms into search engines. These terms were taken directly from the teacher's instructions or from the topic of the lesson. It was the participants' own decision to use those generic terms. For example, Extracts 15 and 16 below illustrate that the participants started their Web search by entering generic terms, such as 'scientist' and 'famous scientist' into the search engine. Their use of those terms seemed to be purposeful as they expressed in the interviews that they were aware of the kind of

search results they would obtain. Being aware of the search results that they would find based on what specific input they entered into the search engine indicates that these participants had, at least, the basic Web searching skills required for that activity.

Extract 15
Group 2_Class 1

> *R: So what did you do exactly to find and choose Galileo?*
>
> *B: The first thing we wrote was 'famous scientist' … umm … famous scientist yeah?*
>
> *A: Yes famous scientist.*

Extract 16
Group 1_Class 1

> *C: We thought of a scientist, a new scientist we did not know about; so we put scientist so that we know a bigger group of scientists.*

The participants also searched generic terms as they were looking for more search results. The participants, as in Extract 17 below, applied this search technique purposefully as they stated that they wanted to find more options. This demonstrates that they were cognisant that searching general terms would yield more search results. It seemed that the more options the participants could find, the easier it was for them to choose. They stated that when they found few names, they could not make a choice, so they looked for more.

Extract 17
Group 1_Class 1

> *C: Maybe because the explorers appeared to be less from the scientists so we could not find more names to choose from.*
>
> *B: We were changing and trying different things to find more names [of scientists].*
>
> *A: We were changing the searching method to find more names.*

However, as shown in Extract 18, when presented with more options as a result of searching general terms, other participants expressed feeling overwhelmed, confused and unable to choose an answer. Unlike in Extract 17, the participants here were looking for specific information, which suggests that searching general terms when looking for specific information caused the participants difficulty in making a selection. Also, the participants reported that their comprehension of the text was challenged because they did not understand certain vocabulary items. In this instance and after realising that the text was linguistically challenging, one participant attempted an answer despite her limited understanding.

Extract 18
Group 2_Class 1

> *B: I think we were trying to find the name of an invention or something. But there was so much on the page and we got confused.*
> *A: Yes and the words there were really hard for us to understand.*
> *R: But you were still able to write something down.*
> *B: I wrote what I understood to be his invention which turned out to be general information about his life.*

5.3.1.1.2. Using keywords

In their attempt to find specific information about Marie Curie, the participants entered a keyword and 'Marie Curie' in the search bar. This reflects a level of understanding of how Web searching tools work as well as linguistic knowledge of, for instance, word classes. In Extract 19, below, when the teacher approached the group to check their progress, he asked them to find out what Marie Curie had discovered. To do that, the participants added 'discover' to 'Marie Curie', which was already in the search bar. While this could reflect the participants' linguistic knowledge about the verb 'discover' being a transitive verb so the answer will be its object, it also shows a strategy of managing the search results, where the participants found the information. By

entering different keywords into the search engine, the participants changed the source of information from one about Marie Curie to a more specific one about her discoveries, thereby demonstrating their understanding of how search engines work. Thus, there was a relationship between the way the learners used the Web searching tool (i.e., entering 'Marie Curie' first and then adding to it 'discover') and their thinking process of knowing that they needed to find the name of the discovery ('we wanted to find out what she discovered') and then their thoughts behind deciding to enter those terms.

Deciding to enter the keyword 'discover' into the search bar happened after the participants analysed the teacher's instructions. As illustrated in Extract 19, when the teacher asked them to find why Marie Curie had won a Nobel Prize, they searched for what she discovered that gave her that prize. This extract also shows that they knew why they were asked to find out about the Nobel Prize that the scientist won. That is, after the teacher informed them that that scientist won a Nobel Prize, one participant pointed out that 'it was not the prize that was important but what she discovered'. This was followed by using the words 'discover' and 'Marie Curie' together in the search bar, so that they could 'find why she won the Nobel Prize'. Extract 19 shows that by changing the information entered into the search bar, the participants were aware that this technique would narrow down the options that would come up as a result of their search: 'B: We were trying to find 'discover' … C: So we changed the search method'. This was a purposeful management of the information sources - a technique that enabled the participants to find specific information.

Extract 19
Group 1_Class 1

> *B: We were trying to find "discover" because the tutor asked us to change one information and find discover what.*
> *C: So we changed the search method*
> *B: We wrote discover about this [explorer/scientist]*
> *…*

B: Yes we were trying to find why she won the Nobel Prize.

C: It was not the prize that was important but what she discovered.

B: It was Uranium.

C: So we wanted to find out what she discovered.

R: What did you exactly do to find that?

B: We just wrote "discover" and the name of the person, Marie Curie. And we immediately found it, on Wikipedia.

Moreover, when the participants felt unable to choose an answer from the search results, they changed the keywords that they entered into the search bar. They were required to find two scientists and two explorers. They started their search by entering 'famous scientists' into the search bar which gave them a list of scientists' names. Then, as participant B explained, encountering the word 'explore' or 'explored' under one of the scientists' names made them choose that person as an explorer. Then they tried to choose another explorer from that same list, but they could not relate to any of the information as the page they were reading only displayed the names of scientists. They then referred back to the keywords they had entered into the search bar and started changing them. The participants stated that going back to the keywords that they entered when they started their search helped them identify why they were confused. Extract 20 below shows that to resolve that confusion, they used their language knowledge by keeping 'famous' in the search bar and entering 'scientist' and 'explorer' one at a time in order to obtain the required information. This extract shows that the participants' use of keywords led to initial confusion and difficulty in choosing an answer, but it also shows that keywords were used to resolve that confusion.

Extract 20
Group 2_Class 1

A: I think here we were looking for an explorer but we could not find one. So we went back to the first page

and we saw that we had put 'famous scientist' in the search box.

B: Yes yes true.

A: We did not write 'famous explorer'.

B: We wanted to start with 'scientist', so we opened a page for 'famous scientists' and we got a list of scientists only. Then when we wanted to choose an explorer, we picked one of the names from that list. That's why we mistakenly chose a scientist thinking that he was an explorer. It was written under the name 'explorer' or 'explored' something. So we confused it with being an explorer.

Furthermore, the participants' knowledge of predictive text technology in Web searching tools helped them to search for a key term even though they were not sure about its spelling. For example, Extract 21 shows that they relied on the search results to resolve their doubt about whether the word 'Canberra', which was on the board, began with a 'C' or a 'G'. Their knowledge of predictive text technology on the search engines enabled them to identify that 'Canberra' was the correct word, which they then used to start their search.

Extract 21
Group 7_Class 1

C: Yes yes, it was about the spelling of the Canberra. We wrote it first with a 'G' instead of 'C'.

R: When did you realise that?

C: When I put it on the search box, I was given different options and because they were different I knew that it was wrong.

R: Right. And also here you [A] were typing something. What was in your mind?

A: I was trying different spellings.

B: Yes we were changing some letters and see if we would get it right.

R: How did you know if you got it right or not?

B: Because when we type the first two or three letters, they give us options. We look at the options and see if any of them matches [what is on the whiteboard].

5.3.1.2. Selection strategy

The selection strategy that the participants from the groups of Class 1 employed in order to select one of the search results are classified into four categories of techniques. First, in selecting an answer, they purposefully looked for what was familiar to them. They also employed another technique as they selected what they could understand, which was facilitated by the multimodal materials of the collaborative CALL environment. Thirdly, the participants used, as a basis for their selections, what they considered to suffice as an answer. A fourth category was the way the participants made use of their knowledge of the required web-based application that they had to use. Examples of how these four selection techniques were used are presented below.

5.3.1.2.1. Selecting the familiar

Familiarity was one of the bases on which the participants made decisions as to what to select as answers. In Extract 22 below, the participants selected a name that was familiar to them, 'not new', and which met the requirement of the instructions set by the teacher.

Extract 22
Group 2_Class 1

R: Why? What did you think about when you saw the name, Galileo?

B: Because the name was not new. We thought it was interesting and also it was not one of the names that the teacher told us not to choose.

A: He [the teacher] specified some names that we should not choose because they were well known.

5.3.1.2.2. Selection based on ease of comprehension

Studying a webpage that presented information in visual as well as textual modes facilitated the participants' comprehension. The extract below shows that the participants selected information that they could understand. The information the participants selected was presented in both the visual and textual modes, and studying both modes helped the participants to assess the relevance of what they were searching, and hence select an answer. The participants faced challenges in differentiating between who was an explorer and who was a scientist, as can be seen in Extract 23 below. The participants then selected a name as an explorer but encountering the word 'writer' in the description of that person made them 'think that the person was not an explorer'. Then they studied images with texts which helped them find out who was a scientist and who was an explorer. That is, this extract shows that information presented in both visual and textual modes fostered the participants' comprehension and helped them select an answer.

Extract 23
Group 2_Class 1

> *B: Yes the word 'writer' was repeated frequently, which made us think that the person was not an explorer.*
> *A: Also on the page, there was a list of images of different people and under each one, it was written whether that person was a scientist or an explorer.*

5.3.1.2.3. Selection based on what is 'satisficing'

While working on a webpage to find and select information, as soon as the participants found what they considered to be sufficient as an answer, they selected that information and stopped reading the rest of that webpage. To illustrate, Extract 24 shows that the participants decided to use the information presented in a box which was part of a text on a webpage. As shown by this extract, the participants identified the information outside that box to be 'a lot' and in the box to be 'brief' and having the 'exact information' they wanted. They then decided to disregard the information outside that box. That is, the participants' decision to use the information in the box was

goal-driven, based on their aim of that search. Because they knew what they had to find, they decided that the information in the box sufficed, and that they did not have to read the whole webpage. As presented in this extract, deciding on what was brief and what had the main information just from a glance over the screen sheds light on how participants processed (or started processing) texts and what attracted their attention first.

Extract 24
Group 1_Class 1

> *C: There was a lot of information but what we needed was all on the right of the screen. It was in a box; the main information that we needed. It was brief. We both pointed as if saying why don't we use the information in this box and ignore the rest.*
>
> *…*
>
> *B: Yes yes. We were reading what was on the screen under general information, but it was all in that box.*
>
> *R: So what came into your mind when you found all you needed in that box.*
>
> *B: It was easier for us to get the information from that box without having to read the whole page.*
>
> *C: It was very detailed; but in the box, it was brief and had the exact information we needed.*

5.3.1.2.4. Selection based on expectation

The participants' knowledge of the Web-based application that they were asked to use helped them anticipate what the answers would be. When asked to use Google Maps in order to find common characteristics between three cities, the participants predicted that the answers would be about economy, location or the climate. Based on that initial idea, they started searching for the answer. That is, their search for the answer was influenced by that initial idea. To illustrate, in Extracts 25 and 26, the participants' initial idea, which was stimulated by being asked to use Google Maps, was that the answer would be about the location of those three cities. That initial idea was followed by using the feature of zooming in and out. Thus, based on the

Web-based application that the participants had been asked to use, they formed an initial idea of what the answer would be and based on that idea, they started looking for it. Extract 26 shows that they ended that process by confirming their initial expectation. These two extracts show a process of deduction that the participants applied which was initiated by the participants' knowledge and experience of the Web-based application that they had to use.

Extract 25
Group 7_Class 1

R: Right so before he suggested Google maps, were you thinking to use any other tool?

C: I first thought that we would have to find information relating to economy.

R: Where from?

C: Nothing in particular was in my mind.

R: What about you two? What came into your mind when the teacher mentioned Google maps?

A: I also thought about location like cities on the coast line.

B: I also thought about information about the climate.

Extract 26
Group 8_Class 1

C: We were thinking about the information that we will use. We were thinking about the information that we will use. When he mentioned Google maps, we knew it's got to do with …

B: Location

C: Oh yeas. That's right we were trying to find Poland.

B: Yes we enlarged the map to see what was in common between the three cities.

C: There were three cities – one in Poland, one in Finland and one in I can't remember now, but they were all on the Baltic Sea.

B: Also on Google map itself there was something written about them [The three cities]. It confirmed what we found out.

Moreover, when the participants found part of the answer using the feature of zooming in and out on Google Maps, they continued using the same technique until they found the rest of the answer. To illustrate, using Google Maps, the participants found that one of the cities was in China, so they zoomed out looking for the other two cities. Extract 27 below shows that the participants' knowledge of and experience in using Google Maps and its features enabled them to select an answer. Thus, it was not only familiarity with that web-based application that enabled the participants to select answers but also their knowledge of how to use its features and services.

Extract 27
Group 7_Class 1

B: We put the names of cities left on Google maps, and A noticed that they were all in China.
R: What made you [A] think they were all in China?
A: We put the name of Hong Kong on Google maps and it was in China. Then we zoomed out and by chance we saw Shanghai.

Furthermore, the participants' previous use of Google Maps influenced the way in which they searched for information. While they were searching using that Web-based application, the participants anticipated finding similar answers to the ones they found in their previous use of it, as shown in Extract 28 below.

Extract 28
Group 7_Class 1

R: Have you used Google maps before?
B & C: Yes.
R: In what?
C: In some other classes of this course.
R: What were you working on?

C: Once we were trying to find the climate in some cities.

B: That was to compare some cities too.

C: And there was another time when we were asked to find and describe the location of some cities.

5.3.1.3. Assistance: Seeking and offering

While working together in their groups, the participants received assistance from three sources. Those sources were the teacher, other learners from the other groups and learners from within the same group. Assistance came mostly in forms of feedback and evaluation. These different forms of assistance are described in the paragraphs that follow.

5.3.1.3.1. Assistance from the teacher

After setting out the activity, the teacher moved around the groups checking their progress. There were instances when the participants sought feedback from the teacher. That included:

(a) seeking confirmation of answers,

Extract 29
Group 2_Class 1

A: It wasn't a man. It was a woman, a scientist woman.

B: is she the one we crossed out.

A: Yes that's the one. And when the teacher came, we asked him and he confirmed.

(b) consulting the teacher when members of the group disagreed with each other,

Extract 30
Group 2_Class 1

A: Yes, there was a piece of information that she [B] had put under background. And I remembered that the

teacher told us to put it under his name. I think he was Italian or British explorer or something.

B: It was like "British scientist" or "Italian", but I wrote it separately as background information.

A: I told her no. But she did not agree.

B: Yes she tried to convince me [Laugh].

A: Until the teacher came and told her [Laugh]

However, Extract 31 below shows that while the reason the participants called for the teacher was to ask about the pronunciation of the scientist's name they chose, the teacher looked at that name and told them that that name was incomplete and they had to go back and write down the rest of the name. What this highlights is that the participants never asked again for the pronunciation which was the reason they called for the teacher. Extract 31 shows that they did not learn the right pronunciation and they jotted it down not knowing how to pronounce it although the correct pronunciation was important because they had to present information about that scientist it orally to everyone in the class.

Extract 31
Group 2_Class 1

A: Ah. The name. We did not know how to pronounce the name correctly.

B: Then the teacher came and told us that 'René Robert' was not the name. There was more to his name.

A: The name was very long, and being a French name, we found it difficult to pronounce.

B: 'René Robert' was only part of his name. We thought it was his first and last name.

R: What were you supposed to write?

B: 'René Robert' and something else, starts with C. I can't remember the name now.

R: How did you know?

B: We asked the teacher. We wanted to ask about the pronunciation of the name, but when he saw the name he told us that it was incomplete.
A: Then we returned back to it and wrote it fully.

There were also instances where the teacher offered unsolicited feedback by which he encouraged the participants to find more information, as a consequence of which the participants returned to the text to find further information. Extract 32 below shows that the teacher used information that related to the participants' own countries (i.e., a name of a city) which stimulated the participants to find it on Google Maps. The teacher's probes in this extract were combined with the visual stimulus from the screen, 'so we opened the map and saw the place. He asked us, is that in Oman?'. That is, the teacher, by using oral probes and visual stimulus, utilised the participants' own backgrounds which encouraged the participants to respond by searching again. This extract shows that in responding to the teacher's probes and by using the visuals of Google Maps, they identified not only the name of that island but also its location, and its size.

Extract 32
Group 1_Class 1

B: So we opened the map and saw the place. He asked us is that in Oman?
A: It was very close to Musandam [One of Oman's provinces]. An island.
R: Did you know about it before?
B: No.
A: I heard about it but did not know where it was.
…
C: We don't know a lot about islands. So I thought it would be small and like that.

Another way the participants responded to the teacher's feedback was by reconsidering one of the answers they selected. As shown by Extract 33, below, when the teacher informed the participants that the university they

selected was where that scientist taught and that they had to find about the one where he studied, they tried to find that information by checking different webpages. However, from their attempt to remember what they selected in the end, they seemed to struggle to distinguish between the university that that scientist attended and the one that he taught at. In the interview, they explained the process they went through, but had difficulty remembering the answer they decided on. This suggests that while the teacher's feedback in this extract had an effect on the process of finding information, it also shows that the participants were still confused between those two pieces of information.

Extract 33
Group 2_Class 1

A: We were trying to find the university where uh uh …

B: Newton studied

A: Yes Newton [Einstein]. We first found the university where he taught but the teacher told us to find the university where he studied. We tried to find it from more than one website, but we couldn't.

B: But then we found it. I think it was in Switzerland.

A: Switzerland yes.

B: No no, this was where he taught, but the teacher told us that before he taught in that university, he studied in another one. I think we found it later; it was in Germany.

5.3.1.3.2. From discussions in other groups

Another type of assistance, which was also from the outside of the collaborative CALL group, was received by overhearing the interaction between the teacher and the students in the other groups. The following extract shows that the participants in one group made use of the teacher's instructions that were given to another group.

Extract 34
Group 2_Class 1

R: What made you [A] suggest that to [B]?

A: Because the other group did something similar and the teacher suggested to them to put that information under the name and under background they need to put place and date of birth and if they have additional information.

5.3.1.3.3. From learners within the same groups

Assistance was also offered by the group members themselves in forms of peer feedback. However, peer feedback was only considered after being discussed in the group. For instance, as shown by Extracts 35 and 36, the participant used the text to support the sufficiency of his feedback, so that the others in his group would agree.

Extract 35
Group 1_Class 1

C: Yes yes. She was telling me that this is the year but I was telling her no that was the century not the year.
R: How did you know?
C: It was written, century.
A: Yes, I think it was the year 1500 and something, and I was telling you it cannot be that this is a century.
C: Yes, I thought that was the century but she [A] corrected me.

Extract 36
Group 2_Class 1

B: And here we were trying to find an explorer and I think here we chose an explorer and we were writing what he did to be famous.
A: She found the information, and when we read it, we agreed.

Also in-group peer feedback was considered after it was confirmed by the teacher, as shown by Extract 37.

Extract 37
Group 2_Class 1

A: Yes, there was a piece of information that she [B] had put under background. And I remembered that the teacher told us to put it under his name. I think he was Italian or British explorer or something.

B: It was like "British scientist" or "Italian", but I wrote it separately as background information.

A: I told her no. But she did not agree.

B: Yes she tried to convince me [Laugh].

A: Until the teacher came and told her [Laugh].

5.3.1.4. Goal achievement strategy

As the participants in the groups within Class 1 worked on the collaborative CALL activities, they employed a number of techniques to achieve their goals. As presented below, the participants, while working on the collaborative CALL activity, moved on to different questions as soon as they felt that they could not find answers. Also, to get the activity completed in time, the participants allocated different roles among themselves. Hence, in carrying out each of those roles, they completed the activity in a collaborative manner. These two techniques are presented and illustrated below.

5.3.1.4.1. Moving between questions

The participants moved between questions depending on whether or not they were able to find the information they needed. For example, Extract 38 shows that when they could not find specific information about one topic, they moved on to the other topic and then came back to it later. By moving between questions, the participants filled in parts of the answers until they answered all the questions of the activity.

Extract 38
Group 2_Class 1

R: What was in your mind then when you said British?

B: Because we had to identify his nationality and where he was born.

A: Yes we had to find the date of birth too. So this Reiney was …

B: No no, wait. This was not Reiney. Reiney was French. Maybe because we went back to Galileo [Isaac Newton]. We were not working on it one by one. No we were doing something about this one and then we would go back to the other one and like that. So for Galileo, we did not write down the place where he was born. We went back to check his place of birth and his nationality. So it was British.

However, the data also show that in moving between questions to complete the activity, the participants included information they were not sure about. For instance, the participants, as shown by Extract 39, were not sure whether the name they chose was for the school or the university that that explorer went to, but they used it anyway even though one of the participants in the group pointed out that it was not correct. They used the Web to check, but they could not resolve it, and the extract shows that to the point of the stimulated recall interview, they were still in doubt. That is, they used unconfirmed information and moved on to the other questions.

Extract 39
Group 2_Class 1

R: You were reading something and you [B] seemed not sure about something. Then you started reading words out of the screen like 'best known' and 'expedition'. Then you asked your friend to open Google. What was going on?

…

A: I think it was something about the background.

B: I think it was when C [who did not come to the interview] pointed at something on the screen. I think we were looking for the university's name.

A: No it was when we were talking about 'René Robert'. No no you are right we were looking for the name of the university that René Robert' went to.
B: It was the name of his school not the university. She [A] did not agree.

5.3.1.4.2. Role allocation

To complete the activity in time, the participants collaborated with each other in different ways. One of those ways is seen in the role-allocation employed by the participants in the groups of Class 1. As illustrated by Extract 40, the participants performed different roles as they worked on the collaborative CALL activities. One participant was pointing at what should be copied, the other was copying it down, and the third decided to go ahead and look for additional information. These roles appeared voluntarily as the participants were working on the activity. That is, the teacher did not ask them to work that way, and the data do not show that it was something they explicitly agreed on as they carried the activity out. This suggests that this collaboration that happened in this activity, which helped the participants complete it, was spontaneous.

Extract 40
Group 1_Class 1

B: No I was not pointing at something [on the screen] in specific. I was just pointing at what she [A] had to copy, so that she write quickly.
R: You [C] you were also looking at something on the screen, was it the same thing they were working on?
C: I was looking for additional information. She [B] was telling her [A] about what we found and I was looking for additional information.
R: On the same page?
C: Yes.

The participants also employed simple forms of collaboration that helped them speed up completing the activity. For example, one participant started

pointing to the exact information on the screen, so that the other participant would copy it more quickly, as in Extract 41 below.

Extract 41
Group 1_Class 1

R: Here one of you [B] will suddenly point at the screen, what did you want to say?

…

B: We were trying to find information, and that was important information.

A: She was pointing and I was writing down.

A similar collaborative technique is also illustrated in the following extract where one learner highlighted what they agreed to copy as the answer.

Extract 42
Group 1_Class 1

B: We were highlighting them in blue so that we know they were important information, and we don't write something different.

R: it was a webpage, wasn't it?

B: Yes it was a webpage.

R: So you were highlighting information on the webpage.

B and A: Yes we were.

However, role allocation caused a clash when some participants moved on more quickly than others. To resolve that clash, the roles played by the participants overlapped. As illustrated by Extract 43, the participant who was copying down, stopped and used the mouse (which was handled by another participant) to get back to the point he was copying. Also, as a performance technique, such roles, i.e., 'copying information' and 'scrolling', seemed to be duties that each learner was responsible for. These duties, as in Extract 40, appeared spontaneously while the participants were trying to obtain information. These duties were also flexible as they changed when there was a need, e.g., needing more time to copy. Also, like the roles/duties in Extract

40, the duties shown in the following extract were complementary as the accomplishment of one required the accomplishment of the other.

Extract 43
Group 1_Class 1

> *R: You [A] you were writing something and then you said something to [B] but she did not hear you or something so you grabbed the mouse and started looking for something. What was in your mind?*
> *A: Because when I was writing, she [B] was scrolling down quickly before I could copy everything.*

In carrying out the roles that they distributed among themselves, it appears that the participants were involved in the activity at different levels. For instance, the extract below shows that one learner was writing down what the other two dictated to her. That is, as shown in this extract, there were participants who read information on the screen and extracted answers, and there was one learner who was only copying down answers. This shows different involvement with language by each of the participants in this collaborative CALL environment.

Extract 44
Group 1_Class 1

> *R: Also you [A], you were pointing at something on your notebook and talking about something you had seen on the screen. What were you trying to say?*
> *A: I can't remember.*
> *B: Maybe she was trying to copy something.*
> *C: Or maybe she wanted to add something.*
> *B: Yes, because she wasn't looking at the screen. She was writing down what we dictate to her.*

The following table sums up the strategies that the participants that all four groups in Class 1 employed.

Strategy	Technique	Extract

Search strategy	Use of generic terms	15, 16, 17, & 18
	Use of keywords	19, 20, & 21
Selection strategy	Based on the familiar	22
	Based on comprehension	23
	Based on what is satisficing	24
	Based on expectation	25, 26, 27, & 28
Seeking/ offering	From the teacher	29, 30, 31, 32, & 33
Assistance	From other groups	34
	From within the same group	35, 36, & 37
Goal achievement strategy	Moving between questions	38 & 39
	Collaboration	40, 41, 42, 43, & 44

***Table 5.2**_Summary of learning strategies within Class 1*

5.3.2. Strategies within Class 2

The participants in the four groups of Class 2 also employed a number of strategies that were the same as those identified in Class 1. As in the groups within Class 1, the participants within the groups of Class 2 applied strategies in searching the Web for information, selecting answers, offering or seeking assistance in similar as well as different ways to those found in Class 1. The strategies are discussed in more detail in the paragraphs that follow.

5.3.2.1. Search strategy

The participants in the groups of Class 2 searched for information by entering generic terms into search engines. Before posting their own opinions about advertising, one participant examined what his classmates had posted and then searched the Web for general ideas about the topic. Searching general

terms related to a topic helped that participant express his opinions easily. To illustrate, the extract below shows that B viewed his classmates' ideas, and then started searching the Web for ideas about advertising that were different from those posted on the blog by his classmates. In the search bar, he put general terms that gave him general ideas about advertising, i.e., not specific opinions. He then included those ideas in his opinion. Writing his opinion in that way, as he stated, became easy after he searched the topic using general terms.

Extract 45
Group 4_Class 2

> *B: Also because most of the students posted their comments before I did, I had the chance to look at their ideas and bring something different.*
> *R: What did you do exactly to find those ideas?*
> *B: I just wrote the topic like 'advantage or disadvantage of …'. I just made it easy for myself.*

That also shows a technique of going from the general to the specific (from advantages or disadvantages of advertisements to specific ideas about advertisements). This technique reflects a certain level of computer literacy, especially knowledge about and experience in searching the Web, at which they could achieve their goals in the activity.

5.3.2.2. Selection strategy

As shown in the extracts below, the participants in the groups of Class 2 selected information based on how easy or difficult they said they found the texts. They also selected information that they described in the VSRIs as familiar. While these two selection techniques are similar to what was found in Class 1, the participants in the groups of Class 2 also selected information after having a discussion between each other to evaluate the available options and agree on one.

5.3.2.2.1. Selection based on ease of comprehension

When asked to comment back on each other's posts, comprehension was one of the bases for selection. As shown by Extract 46, in referring to the texts that the participants selected, they stated that they found those texts easy because they understood them and knew all the vocabulary used in them. This also suggests that the vocabulary used in those texts seemed to play a role in making those texts easy to understand. On this basis, the participants avoided what they could not fully understand. This extract shows that they found commenting on what they did not fully understand risky, and hence avoided it. At least for the participant A, a fully understood text was one where he could understand the vocabulary used in it. This extract indicates that this kind of comprehension was the criterion for selection, not the idea conveyed by the opinion itself, i.e., language in which the opinion was expressed not its content.

Extract 46
Group 4_Class 2

> *A: I was reading the comments and I was looking for one that I can comment on. Then I chose one and started commenting back.*
> *R: So when you saw that comment, what came into your mind? What made you choose that one to comment on?*
> *A: It was the easiest one. I understood it and I knew all the words in it. I did not want to venture commenting on any one from those I did not fully understand.*

5.3.2.2.2. Selection based on personal point of view

The participants also selected answers after setting a criterion according to which they filtered the options and selected one that matched their point of view. To illustrate, Extract 47 shows that to choose between four posts to include in their paragraphs, they identified that two had the same idea and the other two were theirs. They then selected one of their comments and they justified their selection by their personal view that 'people have to ask

about the quality of a product when they see it on an ad'. This is similar to what was found in the groups of Class 1 (Extracts 25 and 26) when the participants based on the Web-based application formed an initial idea of what the answer could be. However, the difference is that in this extract what contributed to forming the initial idea about what could be selected was the participants' personal opinion.

Extract 47
Group 4_Class 2

A: This was when we were trying to choose 3 comments to use in our paragraph. So he [B] was asking me about one of the comments. There were four comments to choose from. Two of them were mine and B's. B was asking me about his comment.

B: Yes there were two comments with the same idea. We wanted something related.

R: What did you choose?

A: We chose mine because we found it more related.

R: What made you think it was more related and it was the one you wanted?

A: Because it was talking about the quality of the product. People have to ask about the quality of a product when they see it on an ad.

5.3.2.2.3. Selection based on familiarity

When the group members had different opinions for what to select and include in their answers, they used their previous experience, which was also supported by the instructions of the teacher. In that way, they reconciled their different preferences and reached a consensus, as shown in the extract below.

Extract 48
Group 10_Class 2

B: Here I disagreed with giving options for that item. I wanted it to be like a Likert scale.

R: What about you [C]?

C: I found A's idea to have options more suitable.

R: What did you choose finally?

A: We chose the multiple choice format.

R: Why?

A: The teacher told us it would be better with options. Also, we knew it would be better because when they give us a questionnaire here at the college we prefer multiple choice questions over all types, as they are easy and quick to do.

Moreover, the participants' previous experience in searching the Web had an effect on what they paid attention to and what they eschewed. For example, when the participants opened the blog, they saw images of commercial advertisements that the teacher uploaded earlier to the lesson. Although a very important part of the lesson, the images were not given priority for attention until the teacher started talking about them. Extract 49 shows that A intentionally ignored those images thinking that they were merely add-ons or pop-up ads. As he explained in the VSRI, participant A hardly paid any attention to them, and only when known to be part of the lesson, did the images become relevant and important. The other two participants in the same group stated that they perceived those images to be part of the lesson. However, as indicated by this extract, the importance of the images as being part of the lesson was recognised by the other two participants, as well as A, as soon as they heard the teacher talking about them. The significance of that recognition is that it marked the actual start of that activity; the start that the teacher planned.

Extract 49
Group 4_Class 2

R: Alright, so when you saw the images on the blog, what came into your mind?

A: I thought it was something else. I thought they were like those ads we find sometimes when we open a webpage. I immediately thought they were not related to the lesson. I was telling myself those ads are

following us even here! Then I heard the teacher talking about them.

R: What about you [B and C], do you want to say something else?

C: Because I was paying attention to the teacher, I knew that those images were about ads which was the topic of that lesson.

B: Yes they were clear.

5.3.2.3. Assistance strategy: seeking and offering

The participants in the groups within Class 2 asked for assistance from a peer and from the teacher when they faced challenges. The data here also highlight assistance offered – and sought from – a more knowledgeable peer. These forms of assistance are presented below.

5.3.2.3.1. From a peer

The data from the groups in Class 2 show that when the participants worked individually each on his/her computer, they stopped to ask for assistance from a peer. The data show that the participants sought peer assistance to check spelling, clarify the instructions or to resolve a technological problem. As the participants were involved in writing their comments, they asked a peer when they needed to check their spelling. Extract 50 shows that spelling was one of the areas with which participants sought assistance from a peer.

Extract 50
Group 3_Class 2

A: Yes because she [C] first commented; or [B] commented first? No no it was C. She commented first and then the teacher commented back with a question. So she was trying to answer and she wrote something and wanted to check the spelling of a word. I checked it for her.

The instructions for the activity were also another area that the participants asked each other about. Extract 51 shows that as one learner was writing his comment on the blog, he stopped to clarify what exactly his comment should say.

Extract 51
Group 3_Class 2

B: I stopped to ask her [C] whether we were supposed to write 'agree' or 'disagree' only.

C: Yes and I told her that we were supposed to provide a bit of explanation.

R: What made you ask? What was in your mind that made you ask that question?

B: I was writing my comment.

C: And there was a topic we had to comment on whether we agree on or not and to say why.

Also, assistance with technological issues was offered collaboratively. Extract 52 shows that a technological issue (using the URL of the comments on the blog) was faced by one of the participants and resolved collaboratively by the participants in the group. What this extract also shows is that the learner who faced the problem knew what the problem was and why it happened, 'I did not pay attention to the teacher when he explained that bit. He explained how to add a comment but I was busy writing my comment on my notebook'.

Extract 52
Group 4_Class 2

A: I think it was about the comment box. There was a place for the name also. It had the name and URL.

B: Yes yes. I did not pay attention to the teacher when he explained that bit. He explained how to add a comment but I was busy writing my comment on my notebook. He [A] then explained it to me.

R: What about you [C]?

C: I was working on my own here.

R: What exactly you [B] were asking about?

B: About the name and URL. I did not know what URL was.

C: You don't write anything there except your name, so that they know who wrote that comment.

A similar form of assistance was also offered to one of the participants who felt confused because she missed parts of the activity as she went out of the class for a few minutes. She asked one of her peers in the group about what they were doing although she was there when they started writing their comments. As shown by Extract 53, she provides two reasons as to why she felt confused: (1) missing parts of the activity and (2) seeing everyone else busy typing. While this shows that participants in the collaborative CALL groups can support each other by clarifying instructions, it also highlights the importance of the continuity and progressiveness of the collaborative CALL activity. Missing the middle parts of the collaborative CALL activity was one of the reasons that made the participant feel confused and seek assistance. This shows that for that participant, collaborative CALL activities were carried out in stages with each stage progressing from the previous one.

Extract 53
Group 3_Class 2

A: I went out of the class for a while and then when I came back I looked at the screen and it was full of comments. I did not know what to do. Then I asked her [C] to tell me.

…

C: I just showed her how to add a comment.

R: Do you know why you [A] felt confused?

A: Because I went out in the middle of the activity. When I came back I couldn't understand what I was supposed to do.

R: How did you know that you did not understand what you were supposed to do?

A: Because they were all typing something on the screen. I did not know what I had to do.

Knowledge of data storage and back up was also a basis for peer assistance. Extract 54 shows that when one learner deleted what she wrote, the others intervened and helped recover it. They did that by restoring the previous saved version of the blog. At that point of the activity, the participants were working individually writing their comments on the blog, but resolving that technological issue brought them together as the solution came from the group as a whole.

Extract 54
Group 9_Class 2

R: Here you typed in something and then immediately, you and your friends shouted "oh no". What happened?
C: A deleted something by mistake.
A: Yes, I deleted something and when I noticed that it disappeared I shouted 'oh no".
C: I think she [A] wanted to copy it and then paste it somewhere.
R: How did you solve that problem then?
B: Even if it's deleted, the programme keeps a copy. We just had to close it and open it again and we found it there.

5.3.2.3.2. From the teacher

The teacher's prompts stimulated one of the participants' thought process which helped him to identify a better word form to include in his answer. As illustrated by Extract 55 below, by asking the participant to think of another word for 'like', the learner immediately said 'prefer', which the teacher confirmed. To respond to the teacher's question and come up with a better alternative for 'like', the teacher's question seemed to have induced the learner to activate his linguistic background knowledge. As shown in this extract, A explained that he came up with 'prefer' to replace 'like' because (1) it was on the worksheet, and (2) he had come across it before. This suggests

that both ‘like’ and ‘prefer’ were known vocabulary to A, but the first that came to his mind was ‘like’ because, to A, it was ‘used more’. Therefore, this extract shows that the learner’s use of the more suitable word needed elicitation, the teacher’s prompting question and support from the worksheet and from being familiar from the other courses.

Extract 55
Group 10_Class 2

R: Here you were trying to check if the question “Where do you like to study” was correct or not. The teacher told you to think of a better word than “like”. You immediately said “prefer”. What happened?
A: We always try to have the best answer in the class. That’s why we always check with the teacher before submitting our answers.
R: Good. But what about when he asked you to think of another word for “like”? You immediately said “prefer”.
A: Because “prefer” was there on the worksheet. I also know it from another course.
…
R: Why didn’t you choose ‘prefer’ in the first place?
C: I was not focusing on the questions as I was busy typing them.
A: I thought ‘like’ would be better as it is used more and its meaning is clear for all. But then I realised that prefer would be a stronger word in this question. I mean it would suit our English level more.

Furthermore, the teacher’s response, in the form of a how-question, made a participant provide more information. As shown by the extract below, the participant responded to the teacher’s ‘how’ question by providing a reason as for why she believed that ads influence people.

Extract 56
Group 3_Class 2

R: So when you [C] saw the teacher's comment to your post, what came into your mind? What did you think about?

C: I wanted to answer his question.

R: … I mean what was the first thing that came into your mind when you saw his comment?

C: I just read the question and answered it.

R: Can you remember what you said in your reply?

C: The question was how do ads influence people's choices? So I said that it makes people believe that this product is of a high quality.

The following extract adds that the teacher's response to one of the learner's comments on the blog had an effect on all the group members. When they saw that within their group the teacher responded only to B, they became involved and read B's comment in order to find out why the teacher chose that one only to comment on. B, who stated that she was happy that the teacher commented on her post, knew why the teacher responded to her. The extract below shows that B knew what was special about her comment, 'I think he commented back to my post because all of them wrote that they agreed, but I wrote that I disagreed'. That is, the teacher's response to one of the group members generated a discussion between the group members in order to know what was in their friend's comment that made the teacher respond to it.

Extract 57
Group 3_Class 2

R: Here you suddenly started laughing and talking about something? What happened?

B: I was happy because I saw that the teacher commented on my post. He said "I agree with B. How do we know if this product is good or not?" So I was very happy because from all the comments there he only commented back to mine.

R: What about you [A]?

A: The same. I was like how come the teacher commented on your comment only!

R: Did you read B's comment?

A: Yes.

The participants also showed a similar interest in what other participants said even before they received the teacher's response. As seen in the extract below, as they were reading the comments of the other participants, they realised that one of their group peers had responded to all the comments on the blog. That was followed by them reading what that participant said. One of the participants stated that seeing her friend commenting on all the posts made her think about doing the same, but she could not because there was no time.

Extract 58
Group 3_Class 2

R: Here you were reading the comments of your classmates and you were smiling and talking about something between yourselves. What was in your mind while reading the comments?

B: I was commenting on every single comment.

A: Yes.

B: Then A mocked me saying you are commenting on every comment.

A: You did not leave any.

R: You [C] too seemed to be involved somehow with the comments.

C: Yes I was reading her [B] comments.

R: So when you [A] were reading the comments, what came into your mind before you realised that B was commenting on all the posts?

A: I liked the comments that I read. They were good and I liked them. So it just caught my attention that B had commented on all the posts.

R: Have you read her comments?

A: Yes she [B] replied to all the comments.

R: Did you want to do the same thing?

A: Yes but we ran out of time.

However, the data from these groups also show that when the teacher was going around the groups checking their progress and trying to offer assistance, one of the participants, as illustrated in the extract below, felt uncomfortable, which negatively affected her involvement and performance in the activity.

Extract 59
Group 9_Class 2

A: I faced a little bit of difficulty, and when the teacher came to help I felt even more nervous and confused.

…

R: What happened?

A: Because the teacher was so close. When he is so close I don't know right from left. But when he goes away, I work normally.

R: Aha, and then you gave up and C got the mouse?

C: Yes, she [A] asked me to continue.

5.3.2.3.3. From more knowledgeable peers

While working together, the participants exhibited some forms of assistance. For instance, in the following extract, A seemed to be the more capable/knowledgeable member of the group. The way he worked in this activity was used as a model by the other group members. When faced with challenges, the other members of the group observed what A did, and how he did it.

Extract 60
Group 4_Class 2

A: There was a button below the page. We had to press that to see the comments.

B: Yes it wasn't clear. I also couldn't find it. Only when A did it in front of me, I knew what I had to do.

C: I also didn't know what to do and he [A] showed me.

R: So when you [B] saw [A] working on it, what was in your mind?

B: I knew that [A] knows how to do it. I heard him say "customer". When he clicked on that button I did the same.

R: How did you know that what you were doing was correct?

B: I just knew it was. Anything [A] does is always correct [Laugh].

The data also show that being the more knowledgeable in the group, A took responsibility and exhibited a higher level of agency within the group than the others did. For example, as shown in the following two extracts, he made sure that the other group members understood the teacher's instructions, and he also clarified what was required and how to go about doing it. This shows that the more capable member offered help not only when asked for it, but also when he felt that his help was needed. This kind of collaboration between the more capable member and the others in the group reflected a positive interpersonal relation between the group members.

Extract 61
Group 4_Class 2

R: Here while the teacher was talking about the images on his blog, you [A] were pointing at something on the screen. What was in your mind?

A: I was pointing at the same images. I saw them [B and C] talking, so I showed them the images the teacher was talking about because I knew they missed that.

Extract 62
Group 4_Class 2

A: I think he [B] was asking me about the comment that we were supposed to write. He asked whether it should be something from our mind or we find on the Internet.

B: Yes I first thought that I had to find an idea from the Web and then I use it in my comment.

A: He thought we had to paraphrase.

B: Then he [A] told me that I could use my own ideas. I was searching on the Internet and then he just told me that I didn't have to.

Assistance from the more knowledgeable member also helped with technological issues. For instance, C, who appeared to be the more capable member in the other group of participants in this group, gave feedback on technical and linguistic issues faced by the other members of the group, as in Extract 63.

Extract 63
Group 3_Class 2

A: Oh yes. Before you can publish your comment, you will have to answer a question to make sure you are not a robot. I did not understand the question. I did not understand the word 'truck' in the question, so I asked C and she told me that I was supposed to count how many trucks in that image.
B: And I laughed at them!

It also seems that within the group, there was a realisation of the importance of having someone with higher language ability and with more knowledge about the use of technology. The participants changed their seating arrangements on this basis, so that the more knowledgeable person would sit in the middle, making it easy for the others to follow. This can be seen in Extract 64 below.

Extract 64
Group 10_Class 2

A: Yes it was clear. It was very important for one of us, at least, to understand how to do it. Then that one person can show the other two.
B: Both C and I were looking at A's screen because he was in the middle. Then we did the same as what he did.
R: Did you wait until A did what the teacher told you to do?
B: Yes and then we copied what he did.

R: Alright. Did you understand how to do it from the teacher's instructions or from watching A?
B: From watching A to be honest.
C: For me I already had the new page open [the solution for that problem]. But I did not know what to do next.

5.3.2.4. Goal achievement strategy

In these groups of Class 2, the participants also applied two techniques by which they aimed at completing the activity within the time available. The data from these groups show that the participants decided to depend on themselves when they still had difficulty after being given assistance. They also distributed roles among themselves which helped them speed up completing the activity. These two techniques are presented in the following two sections.

5.3.2.4.1. Depending on their own resources

To overcome difficulties in completing the activity, the participants depended on themselves when they could not find assistance from the other available resources, such as the worksheet or the teacher. As illustrated by Extract 65, when faced with a difficulty in forming the questionnaire items, the participants first checked the worksheet for support (The activity worksheet is included in appendix 8). When not found, the participants turned to their teacher to seek assistance and only after that attempted the activity on their own. What the following extract also shows is that the participants depended on their own resources after they checked that there were no model questions (or a similar aid) on the worksheet. In other words, there seems to be a process that the participants went through in order to overcome the difficulty of forming the questionnaire items, which seemed to start with seeking aid from the worksheet, the teacher, and then depending on their own resources and after that asking for the teacher's feedback again.

Extract 65
Group 10_Class 2

R: Was this the first time you used Google Forms in class?

A: No. We used it last time but it was just an introduction. So last time he froze our screens and used his screen as a master screen to show us how to use Google Forms. He showed us how to create different types of questions on Google Forms.

R: This was last week, no?

A: Yes it was. That's why it was not too difficult to write. The only difficulty was that the worksheets he gave us did not show the forms of the questions. It just told us about the type of information we needed to ask about, so we had to think about how to form the questions ourselves. That's why we kept asking him how to form the questions.

Moreover, while working on the activity, the participants showed a capacity to foresee challenges in completing the activity, and they reacted accordingly. For example, Extract 66 shows that the participants decided to start the activity although the teacher was still giving instructions about it. The participants stated that they did that because they felt that they would face a problem completing the activity in time.

Extract 66
Group 9_ Class 2

R: Here the teacher is giving instructions verbally to open a new form and rename it, you were following him and looking at each other's screens. What was in your mind?

C: I know we should have listened first and then start applying.

B: We were also concerned about time. He told us that we had 12 minutes to finish everything. It was a lot and we did not want to waste time.

R: So here, were you listening and applying what the teacher was telling you? Or doing it by yourselves because you knew how to do

B: Oh no we were listening and applying what the teacher was instructing us to do.

A & C: yes.

In line with that, the participants opted for using their mobile dictionaries instead of the computer dictionary as they believed they would save time that way, as seen in the extract below.

Extract 67
Group 10_Class 2

> *R: Why didn't you use the computer to check the spelling?*
> *A: The mobile is much faster. Also if I go on Google, I will have to change the language. On my mobile, I use Google Translator. I just open it and use it to find the spelling and pronunciation.*

5.3.2.4.2. Role allocation

The participants carried out the activities collaboratively as they distributed work among themselves. They allocated different roles among themselves in order to complete the activity in time. The data do not show that distributing work among the group members was required by the activity instructions. The extract below also shows that the participants preferred working together, so that they could help each other and get the activity completed easily and quickly.

Extract 68
Group 10_Class 2

> *C: It is much better to work in groups. We can have complementing ideas.*
> *B: Also together, each one can take part of the activity and together each one can help the other with his part. This makes it easy and quick.*
> *A: Also in this activity I was reading out loud to C and he typed it in. This is much faster than me reading and typing it all by myself. It's like 3 in 1.*

The participants, as shown in Extract 69 below, also expressed that having a computer to work on as part of the activity was a reason to distribute work among themselves. They also showed that they realised the benefit of the

computer in speeding up the work, especially its capacity to trouble shoot and to correct mistakes quickly.

Extract 69
Group 10_Class 2

> *B: With a computer, we can divide the work easily, like one would take the role of typing, the other working on the worksheet and the third would be reading the answers to be typed.*
> *A: Also, with a computer, it's much easier to delete something and change it, all with a press of a button.*

The data from the groups in Class 2 also show that the participants were flexible in distributing work and allocating who did what. The extract below shows that when the participants realised that C seemed to know more about using the keyboard, they changed the roles, so that C would type the answers.

Extract 70
Group 10_Class 2

> *R: So why did you change your seats?*
> *A: It's much easier to follow and finish the activity if the person working on the computer is in the middle. We do this in all the lab classes.*
> *C: A asked me to show him where the "," was, so when I showed him he asked me to take his [middle] seat.*
> *B: In this way we could divide the work easily. With C in the middle typing on the screen, and A and I on his left and right working on the worksheets, it was easier to finish. Also, we could check what C is typing and see if there were any spelling mistakes, for instance.*

The strategies of the four groups within Class 2 are summed up in the following table.

Strategy	**Technique**	**Extract**
Search strategy	Use of generic terms	45

Selection strategy	Based on comprehension	46
	Based on personal point of view	47
	Based on familiarity	48 & 49
Seeking/ offering assistance	From a peer	50, 51, 52, 53 & 54
	From the teacher	55, 56, 57, 58 & 59
	From the more capable/ knowledgeable learner	60, 61, 62, 63 & 64
Goal achievement strategy	Depending on their own resources	65, 66 & 67
	Distribution/allocation of roles	68, 69, & 70

***Table 5.3**_Summary of learning strategies within Class 2*

5.3.3. Strategies within Class 3

The results from the four groups within Class 3 are organised into similar categories as those found in Class 1 and Class 2. The data from the groups of Class 3 provided more information about how the participants worked within the collaborative CALL environment. The four types of strategies that the participants employed in Classes 1 and 2 have also been identified in Class 3. The participants in Class 3 employed strategies to search the Web for information, to select answers, to offer or seek assistance and strategies to finish the activity.

5.3.3.1. Search strategy

This section presents two search techniques that the participants from the groups in Class 3 employed. The results from these groups show that the participants entered specific keywords in order to find information. It was also found that they entered specific questions into the search engine, which, as they stated, helped them find answers easily.

5.3.3.1.1. Using keywords

To obtain specific information, the participants entered specific terms reflecting the information they needed to find. To illustrate, in order to find flight details, the participants started their search by googling 'book flights online'. This reflects an adequate level of information literacy, especially in using search engines to find information, as well as linguistic knowledge, which is reflected by their use of the phrase 'book flights online'.

Extract 71
Group 5_Class 3

R: What did you type in the search box?

B: We typed what we needed to find like 'flights to …'

A: I think it was 'flights online'.

C: 'book flights online'.

5.3.3.1.2. Searching through a question

Another search technique that the participants employed was entering the question they wanted to find an answer for into the search engine. The extract below shows that when the participants could not find answers, they opened another webpage by entering the question they wanted to answer. This technique indicates a level of computer literacy and Web search experience particularly in resolving search challenges. The participants stated, as presented in Extract 72 below, that by using exact questions in their search, they made it easier for themselves to find answers. This technique of searching a question could be also considered a purposeful attempt to limit the search results and hence making selection easier.

Extract 72
Group 5_Class 3

B: Here we were discussing about the Louvre and what activities one can do in Paris.

A: We did not find anything on that page, so we opened a new page.

B: We wrote the same question we wanted to find an answer to. That made it easier to find the answers.

5.3.3.2. Selection strategy

Presented with a number of options, the participants employed some techniques that helped them make a selection. As shown by the data from the groups within Class 3, the participants used their personal preferences and their previous experiences to help them select answers. The participants also selected answers that they understood and answers that they found appealing.

5.3.3.2.1. Selection based on personal preferences

To make a choice of a link or information, the participants seemed to be influenced by their personal experiences. As shown in Extracts 73 and 74, presented with a number of flight options, the participants looked for and selected the cheapest flights although there were no instructions asking them to do that. Also, for some of the required information, such as hotels and flights, there were no instructions on what website to use, in which cases, the participants used websites with which they were already familiar. For example, as shown in Extract 74 below, one participant suggested that they use *booking.com* to find information about hotels, and they did.

Extract 73
Group 5_Class 3

B: There were two types of flights on the Turkish airlines. One was cheaper than the other. So I was telling him to choose the second one because it was better.
R: How did you know?
B: It was cheaper.
R: Was that written?
B: Yes yes. It showed the name of the company and the prices.

Extract 74
Group 6_Class 3

A: I think this was when he opened the website. I was telling him about booking.com because we used it last week and he was not in class.

R: Aha, so what happened then? Did you [C] open it?

C: Yes I opened it and we found a lot of hotels to choose from.

5.3.3.2.2. Selection facilitated by knowledge of Web searching tools

The participants' knowledge and experience of searching the Web played a role in what they decided to select as answers. According to Extract 75 below, what made the participants select the first link to be their source of information was their knowledge that 'the first link is the mostly used and visited'. Their knowledge and experience of searching the Web facilitated their choice.

Extract 75
Group 5_Class 3

R: What about you [C] what were you trying to say?

C: I was telling him that we should use that information.

R: What information.

A: The website [Google links].

R: Can you remember what it was?

A: No. It was the first link we got.

R: Why did you choose the first one?

A: Because on Google, the first link is the mostly used and visited.

B: Yes highly used.

5.3.3.2.3. Selection based on comprehension

The data also showed that the participants selected information because they understood it. As shown in the extract below, when presented with a number of options, the participants reported that they selected information because they understood it. This extract also makes it clear that it was not

only comprehension that helped them make an appropriate selection but also being able to identify the information that was required.

Extract 76
Group 11_Class 3

A: We chose two, one about a turtle and the other about a dog.
R: Why did you choose those two?
B: They were clear. We understood them from the titles. We knew how fast they were and where they were.

Also, comprehension and familiarity of the topic facilitated choice. As may be seen in Extract 77, participants selected information that they found to be familiar, understandable, brief and clearly communicated.

Extract 77
Group 11_Class 3

B: Yes right we were trying to write a question about what season tourists like to visit Oman?
R: Why did you choose that information to write a question about?
C: Because it was there [on the page] clearly stated.
A: Yes it was clear and [therefore] easy to form a question from.
R: What made it clear and easy?
A: Because it was about one season only, Winter.
…
A: And the answer was just a number.

5.3.3.2.4. Choice based on what is appealing

In another instance, while trying to find information to write a question for the board game, an image of someone on a scooter won the attention of one of the group's members and he became very excited about it (which is also discussed as a meaning-making element in 5.2.2). It was not clear that the others shared the same excitement, but nevertheless they did not oppose it

or suggest something different. As Extract 78 shows, that image was visually appealing to that participant, and caught his attention due to what it depicted visually, rather than its written content. That is, although that image did not seem to be informative on its own, its attractiveness to that learner and its capacity to evoke the learner's interest and excitement induced the learner to read the text associated with it and find out some information about it, e.g., finding the type of scooter it was and finding its speed limit.

Extract 78
Group 11_Class 3

R: Why did you choose this particular information?

C: Well I liked the image.

R: The image?

C: Yes.

R: What was in the image?

C: It was an image of someone on a scooter. It was clear that he was moving fast?

B: I think it was 95 K/h.

R: What were the other things on that page besides the scooter image?

C: Something about the motorcycles and bicycles.

R: You did not like any of those?

C: No. The scooter caught my attention.

R: What did you find special in that image?

C: The way that boy was standing on the scooter. He had his hands spread in the air, and leaning a bit forward.

R: What about you [A], what did you think about when he was telling you about that question?

A: I was just writing it down.

R: Did you think of the image or something?

A: Oh no. I just wrote the question.

R: Did you know what he was talking about in the question?

A: Yes.

5.3.3.3. Assistance: from worksheets

In both collaborative CALL lessons of Class 3, the participants were given worksheets: a worksheet to complete tables of holiday planning and a worksheet with a template and guidance to create a board game (provided in appendix 7). The data from the groups in Class 3 show that the participants made use of the worksheets in a number of ways. The participants used the worksheet to identify the topics that they had to search and find information about. The participants, as shown in the extract below, used the worksheet as a guide to work on the activity.

Extract 79
Group 11_Class 3

> *R: Did it occur to you how you were going to use it [Guinness World Record Website] in that activity?*
> *C: She [the teacher] gave us a worksheet that specified what we had to look for on that website. For instance, she asked for information about animals.*

Worksheets were also used to refer to which link on Google to use in order to find information. As shown by the following extract, the participants weighed the search results against the instructions found on the worksheet.

Extract 80
Group 11_Class 3

> *R: Here you seemed to point at a multiple of things on the screen. What was in your mind?*
> *B: The links. I was pointing at the links. When we typed "Guinness Record", we got a list of links. I was pointing at the second one because the first was not the right one.*
> *R: How did you know?*
> *B: It was written. The website was written under the link title. The first one was different and the second one was the same.*
> *R: The same as what?*
> *B: As the one on the worksheet.*

5.3.3.4. Goal achievement strategy

The data from the groups in Class 3 show that the participants collaborated in different ways in order to complete the activities in time. They also used the minimum that was required to include in their answers. The data also show that the participants allocated different roles between themselves, so that they could complete the activity in time. These goal achievement techniques are presented in the following sections.

5.3.3.4.1. Collaboration

While trying to copy information from the screen, the participants collaborated to complete the activity. For example, in the following extract, one learner started spelling the word 'achieve' to his groupmate who was copying down an answer containing the verb 'achieve'.

Extract 81
Group 11_Class 3

R: Here you [B] were spelling out something to [A].
A: The word 'achieved'
C: A difficult word, we did not know how to spell it.
R: So you [B] were spelling out that word as it appeared on the screen?
B: Yes.
R: And you [A] were writing what A was spelling out to you?
A: Yes.
R: Why didn't you copy it yourself from the screen?
A: It was not clear. I couldn't see it well.
C: Yeah then later we enlarged the font.

A similar form of collaboration to get the activity completed in time is also illustrated in the extract below. While one learner was copying information

from the screen, another one was following with him and when he noticed that he lost the sentence he was copying, he highlighted it for him.

Extract 82
Group 12_Class 3

R: Ok then I see that you [D] suddenly left the mouse and started looking at the worksheet with B. What was in your mind?

D: I think B lost the phrase he was trying to copy into the question, so I highlighted it and left there for him to copy.

R: Why did you do that?

D: So that he could see it.

B: To make it clear.

The forms of collaboration in the previous two extracts seem to be facilitative and precautionary at the same time. They were facilitative as they appeared to be forms of help to speed up completing the activity. They seem also precautionary as both instances happened when there was a difficulty of spelling a keyword, and a possibility of copying something wrong or spending more time trying to find the information being copied.

5.3.3.4.2. Focus on what is required

While looking for information, the participants paid more attention to what was required according to the activity instructions. For example, in Extract 83 below, one participant suggested that they note down the time of the flight, but they only took a note of it afterwards, when they found a question about it on the worksheet. This extract also shows that the participants together, and via the aid of the worksheet, contributed towards a common understanding of the activity as they were actively involved in evaluating their own understanding of what was required. They stated that they assumed first that they had to find the name of the flight and its type only, but later they realised that they also needed to find the time of the flight.

Extract 83
Group 5_Class 3

R: What were you [A] writing down?

A: I was not writing about the time. Name of the airline and the type of the flight were required only. Then B suggested that we also write the time of the flights. Then we found out the time was also required but it was on the bottom of the page.

B: Yes there was a space for the time on the worksheet. We saw it later.

5.3.3.4.3. Role allocation

In carrying out the activity, the participants allocated different roles to each other. The roles were distributed among the participants by the teacher via the worksheets. As illustrated by the following extract, using the worksheets, each participant worked on one part of the activity, and they seemed to be aware how what they were doing individually was related to the activity as a whole.

Extract 84
Group 6_Class 3

R: What about you [A]. What were you doing at this point?

A: I was busy writing.

R: Writing what?

A: I was writing the things you can do in Dubai for entertainment.

R: Where were you getting the information from?

A: From the table. Everyone was given a worksheet to work on something specific. He [B] has to find information about …

B: The planes, the flight.

A: Yes and he [C] has to find information about the hotels. I had to find information about entertainment in Dubai.

Although the roles were distributed by the teacher, the participants were flexible in adopting them. Each participant's role did not end by completing his or her part, as their roles overlapped. While working on their parts, the participants aided each other to complete what they were asked to do. This kind of flexibility was also found in the groups within Class 2 although there the roles were allocated by the participants themselves.

Extract 85
Group 6_Class 3

C: No no, I think this was when I was showing you the hotel.
A: Oh yeah yeah. Right.
C: Here I was asking him what I should write regarding the hotel room information.
A: Yes. I told him to write about the WiFi.
C: Coffee machine.
A: Yes. I told him to write about the WiFi.
C: Coffee machine.
…
C: Yes I did not want to write about it.
R: Here you C asked B first and then turned to A. What was in your mind?
C: I had the hotel page open and I was asking about. There was a table of information and I was asking them if I could write what was in it.

While searching for answers, the participants were focussing on different but complementary information. For example, the following extract shows that B found out that there were two different flights operated by the same airline, and then drew the others' attention to that information. Another participant in that group seemed to focus on the time of departure and arrival. Both pieces of information were needed and were indeed used to complete the activity.

Extract 86
Group 5_Class 3

A: I think we were trying to write the name of the airline company. It was Turkish airlines I guess.

B: There were two types of flights on the Turkish airlines. One was cheaper than the other. So I was telling him to choose the second one because it was better.

R: How did you know?

B: It was cheaper.

R: Was that written?

B: Yes yes. It showed the name of the company and the prices.

A: Prices in Dollar. It also showed the times of departure and arrival.

However, in allocating different roles among the participants, one participant (C, in Extract 87) played a less active role, less engaged with the Web-based content. The extract below shows that C took charge of the mouse, and followed the direction of the other members of the group. He was scrolling up and down and moving the cursor to where the others wanted it. It was a role that was recognised as such by the others in the group. Such roles, however, reflect different levels of involvement and contribution in the collaborative CALL activities.

Extract 87
Group 5_Class 3

R: What about you [C], what were you thinking about here?

C: I was holding the mouse and moving it where they wanted.

B: He was in charge of the mouse.

The following table puts the strategies of the four groups in Class 3 together.

Strategy	Technique	Extract
Search strategy	Use of keywords	71
	Search a question	72

Selection strategy	Based on personal preference	73 & 74
	Facilitated by previous experience	75
	Based on comprehension	76 & 77
	Based on what is appealing	78
Offering/ seeking Assistance	From worksheets	79 & 80
Goal achievement strategy	Collaboration	81 & 82
	Focus on what is required	83
	Role distribution	84, 85, 8 & 87

***Table 5.4**_Summary of learning strategies within Class 3*

5.3.4. Analysis

The results from the groups within the three classes present a number of strategies that the participants employed. It was observed that the participants employed three strategies in particular in order to obtain information. The results also show that the participants applied a range of techniques within each strategy that helped them obtain information and achieve their goals in the activity. The following table presents the strategies and techniques that have been identified in the three classes. These strategies and techniques are discussed in more detail in the sections below.

Strategy	Technique	Example
Search	**Keywords** General to specific Specific to general	*We put scientist so that we know a bigger group of scientists* (Extract 15) *We just wrote "discover" and the name of the person* (Extract 19)
	Managing and changing modes (text to image/	*I think we couldn't find anything about one of the cities and then, looking at the images, we thought history could be what's in common between them* … *There was a list of images of different people and under each one,*

	image to text, both or just one)	*it was written whether that person was a scientist or an explorer.* *B: So we opened Wikipedia and we found it there* *A: We saw images of huge statues in New Delhi.* *R: And did that make you think about including it under "history" with the other cities?* *A & B: Yes* *…* *R: Why didn't you use Google maps although the teacher suggested it?* *A: We were not convinced that it would help.* (Extracts 10 and 11)
	Utilising Prior knowledge of topic and Web searching tools	*Yes we enlarged the map to see what is in common between the three cities.* (Extract 10) *B: The links. I was pointing at the links. When we typed "Guinness Record", we got a list of links. I was pointing at the second one because the first was not the right one* (Extract 80)
Selection	**Making connections** *Based on* familiarity Based on appeal Based on own experience/assumption/expectations	*B: She was the one that caught our attention among the others because we knew more about her.* (Extract 9) *R: Why did you choose this particular information?* *C: Well I liked the image* (Extract 78) *A: we knew it would be better because when they give us a questionnaire here at the college we prefer multiple choice questions over all types, as they are easy and quick to do* (Extract 48) *C: We were thinking about the information that we will use. When he mentioned Google maps, we knew it's got to do with …* *B: Location* (Extract 26) *B: Because the question required that. The question was about what he did. So the answer ought to be about the exploration that made him famous* (Extract 9)
	Accessibility Easily accessed, clearly presented; understood eliminating the difficult to understand	*A: It was the easiest one. I understood it and I knew all the words in it* (Extract 46) *C: There was a lot of information but what we needed was all on the right of the screen. It was in a box; the main information that we needed. It was brief* (Extract 46). *A: Yes and the words there were really hard for us to understand …* *B: I did not understand some of those ideas. I just chose the one that I understood* (Extract 18) *A: We saw the main words we were looking for … like his father, or*

	Based on keywords	*anything like main words based on which we search.* (Extract 4) *R: So what came into your mind when you saw the word 'establish'?* *B: We would find something about his achievements.* (Extract 1)
Assistance	**Within-group** Going over it again Peer check Worksheet Notebook	*B: We went back to the beginning of the sentence to know if it was the sentence we needed or not … From the context of the sentence. It showed that it was something he achieved* (Extract 1) *C: I was checking if "sell" was the correct word.* *A: Yes the same. I told her that "buy" was incorrect. It should be "sell"* (Extract 7) *B: I thought the spelling of 'study' was incorrect. But I then checked on my notebook and realised it was correct* (Extract 44).
	Without-group Teacher Other groups	*A: We always try to have the best answer in the class. That's why we always check with the teacher before submitting our answers* (Extract 55).
		A: Because the other group did something similar and the teacher suggested to them to put that information under the name and under background (Extract 34).
Goal achievem-ent	**Satisficing** Moving on Collaboration Depending on own resources Distribution of roles	*B: We were not working on it one by one. No we were doing something about this one and then we would go back to the other one and like that* (Extract 35). *B: We were highlighting them in blue so that we know they were important information, and we don't write something different* (Extract 4). *A: It just told us about the type of information we needed to ask about, so we had to think about how to form the questions ourselves* (Extract 65). *B: Also together, each one can take part of the activity and together each one can help the other with his part. This makes it easy and quick* (Extract 68).

Table 5.5_ Strategies and techniques within Classes 1, 2 and 3

5.3.4.1. Search strategy

The findings of this study show that the participants employed techniques in the ways they searched information. These techniques are discussed in the

following sections within three categories: use of keywords, background knowledge and choosing a single or multiple modes.

5.3.4.1.1. Keywords: generic and specific

The way the participants started their search seems to be influenced and oriented by the target information they had in mind. For example, they used collective terms in order to find a number of options to choose from, and they used specific terms in order to locate the exact piece of information they needed about that specific topic. While previous studies suggest that to use a search engine successfully, learners need *language skills* to decide on what keywords to use and *computer skills* to choose a suitable link (Kuiper, Volman & Terwel, 2005; Park & Kim, 2016), the current study provides more details as to how learners choose keywords. With both techniques (using generic terms or specific terms), the keywords the learners used were extracted from the questions/instructions they were directly given, either orally or written on the white board or on the worksheet.

This finding echoes a conclusion reached in a study on how young learners searched the Web in a science class context (Wallace, Kupperman, Krajcik, & Soloway, 2000), where it was emphasised that the search questions and the search tools (i.e., the Web) needed to be carefully provided to the learners. This is because the search question provides the learners with the aim, and the search tool offers the materials from where the information is to be obtained. The importance of this, as discussed earlier, is to promote establishing links between cues in the collaborative CALL activity and what the learners need to find out, hence facilitating the process of meaning making.

Both search techniques were goal-oriented and employing them indicates that the participants had a level of information literacy that was appropriate for the activity. Information literacy has been described as the ability to

define, find and select information on the Web (Warschauer, 2003). For instance, when participants wanted to find more options such as a list of scientists, they used collective terms like ‘famous scientists’ and when they wanted to find specific information, they used specific terms like ‘develop’ or the name of the scientist. That is, in a collaborative CALL activity that required participants to search the Web for information, what determined the starting point of their search depended on the instructions and the participants’ knowledge and experience of using online searching tools.

5.3.4.1.2. Prior knowledge of topic and search tools

The participants’ prior knowledge of the topic and of the Web searching tools helped them to find the information being sought. The results show that the participants displayed an appropriate level of knowledge about using the computer hardware (e.g., using the mouse to zoom in and out and navigating between webpages, and using the keyboard), which enabled them to locate some of the answers. Moreover, their use of particular keywords to search and dialogues with their peers over which link to use (as discussed above) reflect a complex self-regulated process of reading online, i.e., layers of the reading process. This further supports findings from previous studies (e.g., Kuiper et al, 2005; Coiro & Dobler, 2007; Park & Kim, 2016) that skilled readers utilise their prior topical and Web searching knowledge as they search the Web.

5.3.4.1.3. Multiple and single mode

To obtain information, the participants in the groups of the three classes were involved in processing information presented in different modes, primarily textual, visual and auditory modes. The participants seemed to adhere to a single mode as long as they could find the information they sought. However, they also changed the mode they used from text to image and from image to text when they could not decide or find an answer. Realising the need to look elsewhere and use a different mode has been referred to as an independent

fix-up strategy which, according to studies on how learners search the Web, is found to be used by skilled readers (as in Coiro & Dobler, 2007). In addition, participants' decisions to change the mode in which information was presented indicates that they were involved in a process of information evaluation, which is a strategy needed in effective hybrid reading (Park & Kim, 2016). The results also indicate that the participants' choice of mode was influenced by their previous learning experiences. Therefore, in the collaborative CALL environment, the participants' choice of modes depended on two conditions: (1) if the information presented by that single mode sufficed, and (2) if the mode was something the participants had used before in a similar activity.

5.3.4.2. Selection strategy

It was found in this study that the participants selected information that they could connect to or was accessible. These were the two categories in which the identified selection techniques were grouped, which are discussed in the following sections.

5.3.4.2.1. Making connections

One of the techniques that the participants employed in order to decide which information to select was making connections between themselves and the information found. As shown by the results, the bases for these connections are familiarity, appeal and expectations. Once the participants obtained the search results, it was more likely that they would select the option that they knew or had come across before. Also they tended to select what they could relate to, consider interesting and find appealing. In a study of young learners' Web-based decision making, it was found that personal preferences regarding the design of Web pages (i.e., colour, font size and page layout) played a role in what the participants chose (Agosto, 2002a). The current study adds to that finding by observing that participants' decision making in the collaborative CALL environment, a Web search is also affected by how attractive and interesting the 'vehicle' of that information is.

The results show that appeal of information seems to be about its representation more than the information itself that was conveyed by the text (e.g., the information about the fastest electric scooter versus the image of a boy standing on an electric scooter). Compared to Marie Curie's image, which stimulated the participants' prior knowledge (and hence they chose Marie Curie to talk about), the image of the electric scooter connected to that participant by stimulating and evoking his interest and excitement. That is, while searching the Web, what the participants saw in an image, and therefore selected as an answer, was determined by the image's capacity to connect to the learner in a way that can depict something familiar to the learner or evoke the learner's excitement and interest.

This suggests that the process of connection in the collaborative CALL environments in this study was a two way process. The result of such connection process was a language learning process, as discussed earlier in Section 5.2, which was not situated within the collaborative CALL materials nor in the participants but constructed by the way the two connected. While previous studies (Chang et al, 2016) found that being actively involved in multimodal material (e.g., drawing or selecting images while reading) could significantly promote students' reading motivation, foster their text comprehension and develop their inferencing skills, the current study found that relating and connecting to the depictions of images was a learning opportunity that expanded the possibility of tapping into and bringing out the learners' personal interests and excitement. Such a learning opportunity can be also highly motivating for the participants to read and find out more. This finding highlights the unpredictable nature of the learning processes in the collaborative CALL environments as the making of such connections depends on the learner's individual prior knowledge and interests.

5.3.4.2.2. Accessibility

Information on webpages was accessed in different ways but mainly through keywords. The results suggest that the more familiar the keywords in a text, the easier the participants found it to process information. Familiar keywords seemed to play the role of signposts for the participants to find their way into the webpage. The opposite case was also observed as the participants intentionally avoided webpages that presented them with unfamiliar vocabulary. That is, while searching the Web and deciding on what information to select, the participants examined the language used on the webpage, and based on that examination, they decided on whether to select that information or to look elsewhere. This is a similar strategy to those found in other studies (e.g., Agosto, 2002a; 2002b); and has been referred to as a strategy of 'reduction' by which learners limit their Web search to what they know and understand. In the current study, the familiarity of keywords played an essential role for learners to be able to access to and comprehend information before deciding what information to select and work with.

Another way of easing access to information was when a webpage included a box, for example on the side-bar of the webpage, as a summary of a lengthy text. As shown by the results, and illustrated in Extracts 24 and 46, a box that presented information briefly attracted the participants' attention and hence influenced how they interacted with the rest of the content of that webpage. While a previous study (Álvarez, 2016) found that what makes information salient - and hence accessible - are textual elements and features such as the headings, boldface, italics and the use of different colours, the current study adds brevity to that list. The results suggested that the salience of brevity on a webpage depended on using vocabulary that the learners knew and recognised as keywords and also on being clearly presented as related to a lengthy web-based text. This is a strategy that the participants used to ease their access to the information they needed. The significance of being able to access information on a webpage is considered one of the key competencies essential for online reading by The Program for International Student Assessment (PISA; as cited in Chan & Unsworth, 2011).

5.3.4.3. Assistance

After selecting an answer, a range of techniques were applied using within- and without-group sources. One of the within-group sources was the context in which the information was presented. The results show that the participants used the context to evaluate their selection either by going over the whole text again or by rereading that one sentence with the information in question. The results from the current study show that the participants evaluated their selection using the textual context when they were in doubt and/or to confirm their selection. This is similar to the findings in a study that used think-aloud protocols (Cho & Afflerbach, 2015). In that study, it was found that strategic readers evaluated content of webpages by going back to previous parts of the text. Also, another study (Park & Kim, 2016) reported that skilful readers applied a strategy of moving back and forth in the text, which is also considered an indicator of adequate computer and information literacy, as defined by Warschauer (2003). As discussed earlier, this technique of going back and forth is an integral part of the meaning-making process in the collaborative CALL environment.

Another within-group evaluative technique was peer check. While working on the collaborative CALL activities, the participants evaluated their selection and understanding of instructions by explicitly requesting feedback from a peer. The results in this study indicate that the participants were aware of the benefits of seeking feedback from a peer. This finding is supported by the learners' explicitly declaring preference for working in groups, as shown in Extracts 68 and 69. While this finding may not indicate a preference for peer-feedback in the collaborative CALL activities, it still reflects a positive attitude towards it. This aligns well with the findings of a study into the role of the collaborative L2 synthesis writing using Web 2.0 tools (Strobl, 2014). Using a post-hoc survey, that study showed that the participants responded positively to the items regarding peer-feedback (e.g., the mean rating for ''I learned from receiving peer feedback'' was 3.25/5, and for ''Our feedback helped improve the final text quality'' was 3.71/5). Moreover, the results from the present study indicated that participants requested feedback from a peer

mostly about word choices, vocabulary meaning, spelling and the activity instructions. However, the results also highlighted the danger of becoming over-dependent on one learner in a collaborative CALL group, as in Extract 60, where one participant claimed that 'anything [A] does is always correct'. Nevertheless, utilising the peer feedback in collaborative CALL groups demonstrates that the participants not only made use of each other as sources of feedback but also recognised and appreciated the value of the collaborative nature of the collaborative CALL activity.

Worksheets were also used as another within-group source of assistance. Worksheets played a role of providing the participants with some guidance regarding how to start the activity and what to include or not in their answers. A similar source of assistance was the participants' notebooks, which they used to check spelling as well as note down ideas. The role of the computer was one among these other within-group sources for evaluation and feedback. However, apart from the spelling check that the learners responded to by using the predictive text technology on the computer, it was observed that the computer performed a limited role as an evaluator or assistance provider. For example, when the computer indicated misspelled words, the participants either right clicked the misspelled word, tried different spellings until they got it right, checked their notebooks, or asked a peer for the correct spelling. Also, the participants depended on their collective guess when they were not sure about the meaning of a word (e.g., 'taxes' and 'taxis', as in Extract 8). They also opted for using their mobile dictionaries to check the meaning of certain vocabulary items when none of the group members seemed to know. While these instances may reflect different levels of computer and information literacies (especially about computer online dictionaries), they also support the participants' positive attitude towards the role of within-group peer assistance in the collaborative CALL environment.

The without-group sources of evaluation were the tutor and the participants in other groups. The participants requested assistance from the teacher in order to confirm their choices (e.g., answers and spelling) and to clarify

instructions. The results showed that the participants benefited from the teacher's assistance, from his/her provision of scaffolding. For instance, the use of prompts by the teacher stimulated the learners to produce improved answers (e.g., coming up with 'prefer' instead of 'like', as shown in Extract 55,). As indicated by the results in this study, this kind of feedback was simultaneous and dialogic. This accords with a study (Berglund, 2009) that investigated the role of interaction in a multimodal video conferencing environment, where it was found that the learners benefited from simultaneous feedback. Another without-group source of feedback that the participants used for completing the collaborative CALL activity was the learners in the other groups. The participants benefited from overhearing other groups' conversations which helped them to understand how to go about completing the activity. This capacity of incorporating and utilising without-group sources of assistance, alongside the within-group ones, signifies the dynamicity and flexibility of the collaborative CALL environment, as it shows multiple and variable sources of information and assistance in the collaborative CALL environment.

5.3.4.4. Goal achievement

By employing techniques like moving on to another question when facing difficulty, highlighting text, depending on their own resources, and the distribution of roles, the participants prioritised completing the activity. This reflects the participants' experience in carrying out the collaborative CALL activities. In the current study, the goal achievement techniques are described using the concept 'satisficing' (Simon, 1979 cited in Agosto, 2002a), which refers to a strategy by which learners choose what *suffices* ('Then we found out the time was also required but it was on the bottom of the page', in Extract 83) and what *satisfies* ('C: It was very detailed; but in the box, it was brief and had the exact information we needed', in Extract 13). Similar conditions to those suggested by Simon (1979), i.e., having limited time, knowledge and resources, were found in the current study and the participants opted for what was satisficing. That is, the participants here decided to spell or highlight words for each other to copy, and they moved on

to different questions because of time pressure (e.g., Extracts 66 and 68). Previous studies have found that highlighting text online, as a way of online annotations, has a positive impact on reading comprehension (AbuSeileek, 2011), and it helps foreign language readers to reduce their cognitive load (Yeh et al, 2016). Additionally, the participants guessed answers when they were not sure, so that they could complete the activity in time.

The description of satisficing as a strategy aligns with the findings of a study that analysed learners' group documents and self-reflections in order to investigate the learners' collaborative writing processes (Onrubia & Engel, 2009). In that study, it was found that when learners cooperated through distributed roles they could complete the activity. However, that study also found that in collaborative writing, cooperation can be improved when the learners follow 'cooperation' up with a negotiation and revision of their written product. Nevertheless, the significance of applying satisficing techniques in the collaborative CALL activity, which is more than a writing activity, is that ''satisficing is a highly rational, efficient decision-making behavior'' (Agosto, 2002a, p. 17) as it reflects how learners strategically cope with some challenges in the collaborative CALL activities, mainly time and cognitive overload.

5.4. Summary

The results have shown that the participants initiated the process of constructing meaning by attending to cues in their collaborative CALL environments. Their attention to cues was found to be guided and influenced by their perception of the relevance between what they had to achieve and what the cues stated or depicted. Their perception of that kind of relevance was also found to be influenced by the participants' background knowledge of the topic, previously used language, adequate computer and information literacy, feedback and assistance from the tutor and/or other learners. In light of these findings, it was concluded in this study that authentic language use emerged in these collaborative CALL environments through a process of

engaging with cues, signalling relevance, taking action and evaluating whether or not that language was what they required. Within this process, the participants employed a range of purposeful actions through which they searched and selected information, offered and received assistance and achieved the goals of the CALL activities as they perceived them. A full summary of these strategies is provided in Table 5.5. The participants' employment of these strategies in the collaborative CALL environments was found to have an influence on the ways in which the participants interacted with the materials and with each other to achieve their aims within the CALL activities.

The findings provide information about cues within the activities that the participants attended to more than others. Studying the features of such cues in relation to what the participants were trying to achieve as well as the language they used while attending to such cues has led to the interpretation in this study that what influenced the salience of cues within the collaborative CALL environment is not in the cue itself but rather in the capacity of the cue to facilitate connections with the learner's background topical or language knowledge, interests and preferences. This capacity was found in this study to be influenced by whether or not: (a) relevance was signalled between the cue (e.g., a key word in a text or depictions of an image) and what the learners were trying to achieve, and (b) a connection with the cue was established by the learners in relation to their personal interests or background information about the topic.

The findings here helped to explore the contextual factors of the collaborative CALL activities and identify them as factors from within the collaborative CALL groups (e.g., learners, computer-based material, print material, learners' own notes) and from the classroom (e.g., tutor and other learners). Their influence on the participants' language use was in forms of assistance with instructions, feedback on choices and cue provision.

Chapter Six: Discussion and Conclusion

6.1. Introduction

While the previous chapter presents an analysis of the findings in relation to the research topic; that is, the emergence of authentic language use in collaborative CALL environments, the following section discusses the findings in relation to the theoretical framework for the specific purpose of addressing the research questions in this research study. The third section of this chapter then explains the contribution to knowledge made by this study and outlines how the findings could be applied in the classroom and at policy level. The chapter then goes on to highlight some identified limitations to the study, proposes issues and topics that future research could benefit from and finally summaries this research project.

6.2. Addressing the research questions

The analysis of the data and discussion of the findings in Sections 5.2 and 5.3 of the Findings chapter are revisited and re-organised in this section for the purpose of demonstrating how the study has addressed the research questions. From a joint perspective of CT and NH, the current study set out to investigate how authentic language use emerges in collaborative CALL environments. The study addresses three research questions, which are:

- How do instances of authentic language use emerge in a collaborative CALL environment?
- How do the features of the affordances within the collaborative CALL environment affect the salience of certain language forms?
- What are the specific contextual factors that might impact language emergence in the collaborative CALL environment?

The following sections elaborate on how each of these questions has been addressed in this study.

6.2.1. How do instances of authentic language use emerge in a collaborative CALL environment?

To address this question, the meaning-making process identified in this study provides an explanation of what language emergence in the collaborative CALL environment is and what facilitates it. As discussed earlier in 5.2.3, language emergence in the collaborative CALL environment was promoted by the construction of affordances. These affordances were constructed by the interaction between the components of the identified meaning-making process, as presented in Diagram 6.1 below. The interaction between these components, which are components of the meaning-making process, can be viewed as part of the language development system that gives rise to language emergence in forms of authentic language use instances. In other words, such interaction which is initiated by the ways in which leaners attend to and engage with cues in the collaborative CALL environment is viewed as opportunities for the emergence of authentic language use - a view that is in accordance with the position within the ecological approach that CALL environments facilitate the provision of a range of opportunities for the actively involved learners to construct meaning (e.g., Collentine, 2011; Derry, 2008; Peng, 2011; van Lier, 2004). This view also aligns with how emergence in complex dynamic systems, such as language development, has been defined (e.g., Ellis & Larsen-Freeman, 2006; Larsen-Freeman, 2016a; MacWhinney, 2006).

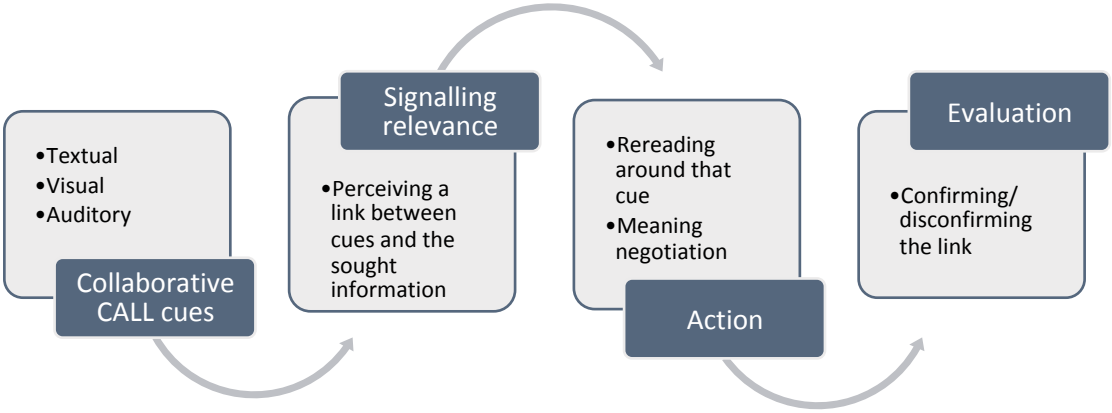

***Diagram 6.1**_A process of language emergence*

For example, the participants used some textual elements after they were perceived as relevant to what they wanted to find out, which was followed by an action that helped them decide whether they would use those forms or not. This process marks an instance of a novel language use that can contribute towards language development. As has been argued, instances of novel language use play a role in language change (Ellis, 2008a; Larsen-Freeman, 2011), and as phenomena, they represent an emerging 'learning system' (Davis et al, 2004, p. 2). As shown by the findings, those selected textual elements were not linguistic forms that the participants encountered for the first time, but, as discussed in 5.2.3, the ways in which the participants processed them were novel and specific to those particular contexts. Therefore, the language emergence in the collaborative CALL environment is not necessarily the use of new and unexpected language forms (as stated in Larsen-Freeman, 2014a; 2016a; MacWhinney, 2006), but rather emergence also relates to that specific, authentic instance in which language was used and developed, as language emerges and develops through use (Ellis, 2008a; Larsen-Freeman & Cameron, 2008).

Therefore, if language emergence can be seen as occurring at macro- and micro-levels (as in Larsen-Freeman, 2016a), then the process illustrated in Diagram 6.1 above falls within the category of micro-level. It is within the micro-level because it illustrates the emergence of novel uses of linguistic forms. The micro-level of language emergence aligns with what has been described as bottom-up language emergence (Larsen-Freeman, 2016a) that arises from interactions of multiple agents in that specific collaborative CALL environment.

The macro-level of language emergence is the emergence that is not ''a one-time operation'', but it is ''the spontaneous creation'' of language use patterns (Larsen-Freeman, 2016a, p. 18) across multiple timescales (MacWhinney, 2006; van Geert & Verspoor, 2015). In other words, the macro-level of emergence is the emergence of order, i.e., the self-organisation of language

use patterns (Larsen-Freeman, 2016a). It should be stressed that the macro-level of emergence is not within the scope of this study. However, the significance of the micro-level of language emergence found in this study is that it represents a step taken towards the emergence of order. This accords with the argument that language is a complex adaptive system that operates across levels in which ‘‘each emergent level cannot come into being except by involving the levels that lie below it’’ (Ellis & Larsen-Freeman, 2006, p. 576).

If the outcome of this meaning-making process is language emergence in the form of instances of authentic language use, then what triggers this process is what facilitates language emergence in the collaborative CALL environment. This process, as shown by the findings, started with the participants attending to some textual, visual, and/or auditory cues. Since what facilitated attending to those cues was the link perceived by the participants between those cues and the information they wanted to find, this proposes that the perception of such links depended on the participants’ ability to perceive the relevance between those cues and what they wanted to find out. For the participants to be able to perceive that relevance, they needed two facilitative elements: (1) knowledge of the requirement of the activity, and (2) background linguistic knowledge and/or personal connection. These two elements provide an explanation as to why what has been called ‘the attentional construct of orientation’ (Tomlin & Villa, 1994), discussed earlier in 3.3.2.1 may take place.

This construct of orientation is similar to the concept of signalling relevance in this meaning-making process. Because orientation is the directing of attentional resources to a sensory information (textual or visual) at the expense of excluding others (Tomlin & Villa, 1994), signalling relevance can explain what facilitated orientation. That is, what facilitated assigning attentional resources to the linguistic cue ‘develop’ or the visual cue of Marie Curie’s image from everything else on those webpages were: (1) the comprehension of the activity requirements and (2) the role of the

background linguistic knowledge and personal interests and views that the individual participants brought into the activity. This also accords with the argument that to understand the role of attention in language emergence, the nature of the linguistic item used in a language activity and individual learner differences need to be considered and viewed from an interactive perspective (Simard & Wong, 2001, p. 105).

Furthermore, collaboration in the CALL environments played a role in facilitating the process of language emergence shown in Diagram 6.1. For example, in some instances, the process of signalling relevance was initiated through collaboration and negotiation for meaning between learners in the collaborative CALL groups such as the meaning of 'explore' and 'develop' that was negotiated by the group members, after which they agreed on a meaning that matched what they were trying to achieve. This finding concerning the ways in which learners collaborate and negotiate for meaning in CALL environments aligns with findings in previous studies that examined small groups' interactions in wiki collaborative writing (e.g., Li & Zhu, 2017). This role of collaboration in CALL environments accords with the argument that the significance of collaboration in a language activity is in being a means of communication as well as a cognitive tool (Chapelle, 1997). Moreover, collaboration promoted learners' autonomy. As discussed in 5.3.1.3, through collaboration learners provided assistance and feedback to each other in order to achieve their goals in the activity. It has been argued that learning activities that provide learners with opportunities in which they negotiate meaning and synthesise content have the potential to foster autonomy (Littlewood, 1996). The results in this study have also shown that the learners, while carrying out the activities, stopped to ask the teachers and other learners questions, the answers to which influenced their understanding of the activity requirements and/or of the content on webpages. Such a learning environment has been described as a rich learning environment in which learners are aided to assume responsibility for their learning process (Schwienhorst, 2003).

However, the results in this study have also provided evidence that collaboration can be disadvantageous as it can affect the level of learners' engagement with the activity. The findings in this study revealed that in some groups the learners identified one of their peers as the more knowledgeable in terms of language ability and information literacy. This was seen to have an influence, positive or negative, on their level of engagement with the activity, as shown particularly in Group 2. That is, while the results have shown that collaboration and interaction between and among learners promoted the process of signalling relevance, in some instances less knowledgeable/capable learners accepted what the more knowledgeable/capable suggested on an 'anything [A] does is always correct' basis.

6.2.2. How do the features of the affordances within the collaborative CALL environment affect the salience of certain language forms?

The linguistic items that promoted the process of signalling relevance (Diagram 6.1) were salient for the participants in this study. As has been pointed out in the scholarly literature, salience is what makes items stand out for agents to attend to (Cintrón-Valentín & Ellis, 2016). Also, in some instances of the collaborative CALL activity, nonlinguistic items such as images received more attention from the participants than text. As discussed previously, the participants paid more attention to textual cues because of their perceived capacity for relevance - between the cues and the information the participants were trying to find. Furthermore, as the findings in this study revealed, the participants' prior linguistic knowledge as well as their personal interests and preferences played a role in signalling relevance by establishing connections between those linguistic and visual cues from the collaborative CALL environment and what the activity required. The relation between the learners' prior knowledge, signalling relevance and the achievement of the activity's goals that this finding reveals offers another way to understand the role of prior knowledge in language use than has been shown in previous studies where prior knowledge was discussed in terms of

knowledge of how websites are organised and navigated and was linked to facilitating goal achievement (Abram, 2016; Levak & Son, 2016).

Another factor that enhanced the salience of linguistic cues was the participants' initial thoughts that they formed based on one of the elements within a given activity, such as the use of Google Maps. Their initial thoughts about what the answers would be directed their attentional resources towards specific linguistic cues and away from others. This is similar to the learning phenomenon referred to as 'learned attention' according to which learners shift attention towards certain cues based on their prior associations (Ellis, 2008b). The interpretation of this finding suggests that the salience of the cues within the activities were enhanced by participants' initial thoughts about what the answers would be before they started searching for the answers.

What enhanced the salience of those linguistic and visual cues was a capacity for connection, which was established when relevance between the aim of the activity and the cue was perceived. This suggests that salience in the activities undertaken in the study was not in the cue itself, but rather it was in the establishing of those connections and associations. Establishing such connections, as discussed previously, was preceded by an interaction between the learner and those cues in the collaborative CALL environment. While this view on salience aligns with the argument that salience resides not only in the cue, but also in the agent, the agent's learning history, and in the context (Cowart, 2004; Ellis, 2016), it also adds to this position from the perspective that knowing and understanding the activity's requirements is equally important to make a cue stand out. That is, salience in collaborative CALL environments does not lie in the physicality of the cues, but rather in whether or not a connection is established.

This view on salience accords with the meaning-making process presented earlier. The meaning-making process is triggered when a linguistic cue in the

collaborative CALL environment becomes salient. A cue in the collaborative CALL environment becomes salient when it signals relevance. Based on the definition of language use affordances in this study, such instances, where a linguistic cue signals relevance that attracts the learner's attention which is then followed by an action and evaluation, are affordances of language learning being operationalised. That is, when cues in the collaborative CALL environment signaled relevance, they became salient, and that salience facilitated the construction of affordances for language use in the collaborative CALL environment.

However, an element within the collaborative CALL activity could be attended to more than other elements not necessarily because it signals relevance to the aim of the activity but because the learner connected to it on the basis of being: (a) perceived as appealing, (b) repeated frequently, (c) easy to understand, or (d) clearly laid out. Also, salience of an element in the collaborative CALL activity was reduced when resembled an element of webpages that the learner usually disregarded, such as pop-up images of commercial advertisements.

To sum up, what affected the salience of cues in the collaborative CALL environment, be it textual, auditory, or visual was complex as it depended on:

- What the individual learner brought into the activity (e.g., his/her comprehension of the instructions, linguistic knowledge, topical knowledge, personal interests and preferences, and previous learning experiences)
- Elements in the collaborative CALL environment (e.g., a webpage, web-based application or programme, worksheets, group members' and tutor's assistance).

6.2.3. What are the specific contextual factors that might impact language emergence in the collaborative CALL environment?

As the participants were working on their classroom activities, a number of contextual factors influenced their involvement in the interaction and collaboration within the groups, including being involved in the meaning-making processes presented above. Some of those factors were components of the groups and others were components of the language class as a whole of which those groups were part. The within-group factors included the learners, the computer, worksheets, and learners' notebooks. The without-group factors consisted of the teacher and other learners. The findings have revealed that in collaborative CALL environments, the teacher had an influence not only on raising the learners' awareness and setting the activity as found in a number of CMC studies (such as Mercier et al, 2016; O'Rourke, 2005; Zeng & Takatsuka, 2009) but also on the emergence of authentic language use by being the source of cues for the learners, as illustrated in Diagram 6.1.

As discussed previously, it was the interaction between some of these contextual components that facilitated the participants' involvement in meaning-making processes. Table 6.1 below presents the collaborative CALL environments' contextual factors together.

Category	Component	Influential factor	Resultant influence
Within	Learners	- Prior knowledge - *linguistic knowledge and knowledge of the topic.* - Computer and information literacies - Personal preferences and views - Collaboration	Forming initial ideas, associations and connections ↓ Signalling relevance ↓
	Computer • Webpages • Images • Google maps • Google docs.	Cue carrier - *to be attended to by the learner(s)*	

	Worksheets	Assistance - *with spelling and instruction comprehension.*	Goal achievement
	Learners' notes		
Without	Tutor		
	Other learners		

Table 6.1_ Collaborative *CALL environments' contextual factors*

The within and without components of the collaborative CALL environment interacted together in a way that facilitated the meaning-making process and the achievement of the learners' goals within the activity. That interaction was dynamic and nonlinear - a process of interaction between the within and without factors. It was a process that depended on what the learners brought into the activity (i.e., prior knowledge and preferences) and on the signalling of relevance between the cues in the collaborative CALL environment and what the learners wanted to achieve. This reflects a proactive role played by the learners in the collaborative CALL activities since proactive learners are those who ''exercise … self-influence in the service of selected goals and desired outcomes'' (Bandura, 2006, p. 165).

This idea that links proactivity and goal achievement in the group activities suggests that the interaction between the contextual factors can be highly individualistic and learner-driven. That is, what the individual learners already know (or do not know) and what kind of relevance is being signaled have an influence on the emergence of authentic language use in the collaborative CALL environment. Being involved in such self-driven language use process indicates that the learners had a high level of agency. This kind of agency facilitated the learners' involvement in meaning-making processes and language use instances, as found in this study. As this aligns with the way learners' agency has been described as the ability to self-regulate in pursuit of goals (Duff, 2012), it accords with the argument that proactive engagement is at the heart of self-regulated language learning (as in Bar, 2009; Yang & Chen, 2007). That is, among all of these influential contextual factors in those collaborative CALL activities, the learner was the central component. The learner was not only influenced by the other components in

the collaborative CALL environment (e.g., the web-based application) but had also an influence on what they depicted and signaled.

The interaction between these contextual factors was fueled with 'energy' (i.e., information) from open sources. These sources included the Web and the learners' collaboration with each other and with other contextual factors in the collaborative CALL environment. These open sources provided the group activity with the necessary flow of new information and energy, and emphasised the complexity of developing language in a collaborative CALL environment. The significance of such free flow of energy into a system lays in its potential for enhancing the emergence of novel language use as described by Larsen-Freeman (2016a). Moreover, the role of what the individual participant brought into the collaborative CALL activities and how relevance was perceived highlights the significance of the starting point of the activity. This aligns with the notion within CT that complex systems (like collaborative CALL environments) are sensitive to their initial conditions (de Bot, 2008b; Larsen-Freeman, 2016a; Larsen-Freeman & Cameron, 2008).

In summary, the contextual factors that influenced language emergence in the collaborative CALL environment can be arranged into three categories, personal, physical and social. The personal category of the contextual factors includes what the individual learner brings into the activity, such as prior knowledge and experience and initial thoughts. The physical category includes the physical components of the collaborative CALL environment such as the computer, worksheets, the whiteboard, the other individual learners and the tutor. The social category includes the collaboration that takes place in the collaborative CALL environment, which is also what links the first two categories. Since it has been argued that language patterns emerge when the learner's internal subsystems interact with external subsystems (van Geert & Verspoor, 2015), the current study underscores collaboration as a third category that is neither internal nor external. It also positions the individual learner at the centre of the language development process. That is, being part of the physical and the abstract contextual

factors, the individual learner is central in the process of language emergence. It is the individual learner that makes the interaction between the two categories of the contextual factors of the collaborative CALL environment happen, and hence language emergence is fostered.

6.3. A new model of language emergence

Through the findings discussed in Chapter Five, this study has shown how within an authentic CALL environment the process of language emergence takes place. By combining the theoretical perspectives of CT and NH, mediated by the concept of affordances, this study has shown that language emergence is triggered by cues in the environment and that attending to these cues is facilitated by the participants' prior knowledge, interests and perception of the activity's goals. In other words, the study has developed a novel way of explaining language development at a micro level. This is illustrated in Diagram 6.2.

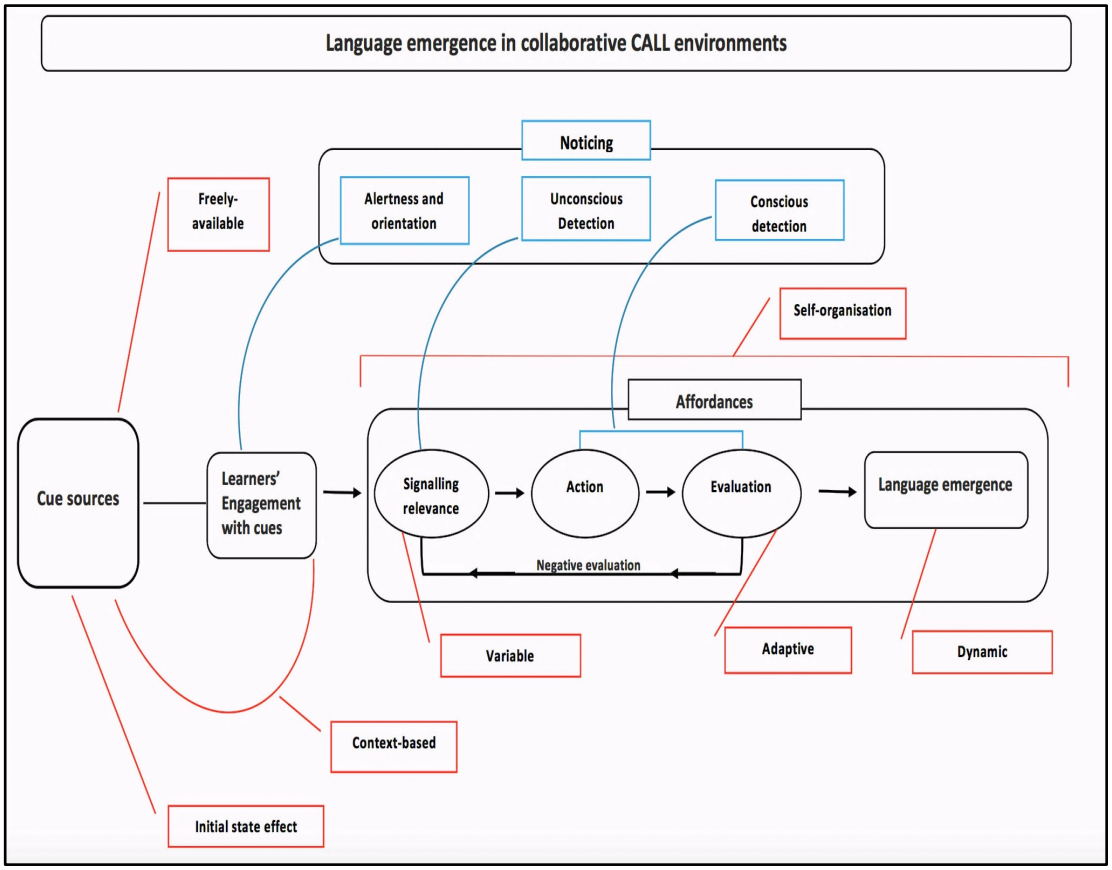

Diagram 6.2_ *A model of language emergence in collaborative CALL environments.*

The diagram shows that the process of language emergence at its micro level is triggered by the way in which the learners engage with cues in the collaborative CALL environment. The sources of cues in this environment are the technology-based material, print material, tutor and other learners. It is this capacity to provide cues for the learners to engage with, which triggers the process of language use emergence, that is how this study relates to technology as well as the other components of the CALL environment. Being a freely available and accessible source of cues, technology-based material makes the collaborative CALL environment rich in stimuli. As a rich source of stimuli, it follows that technology is what distinguishes collaborative CALL environments form traditional language learning environments where, for example, communication and interaction is emphasised but through the use of limited sources of stimuli. As discussed earlier in Chapter Three, the significance for the learning environment to be rich in stimuli lies in the potential of such environments to provide a variety of forms which learners have access to and are able to select those that help them develop – in other words, "the more different forms from which they can select, the more likely development is to take place" (Verspoor et al, 2008, p. 217).

This study has revealed that the learner's engagement with cues in the collaborative CALL environment is facilitated by: (a) learner's perceptions of the goals of the collaborative CALL activity, (b) their background knowledge, and (c) the personal interests and views that the individual participants bring into the collaborative CALL activity. These facilitative elements have an influence on how the learners interact and engage with the cues from the CALL environment, influencing particularly what they choose to attend to. This interactive engagement is then followed by the process of signalling relevance, action and evaluation - constructing an affordance of language use.

Diagram 6.2 also shows the relation between this process of language emergence at its micro level and the components of the theoretical framework of the current study. The language use affordances in

collaborative CALL are constructed as a result of the learner's active engagement with the collaborative CALL sources of information – a process that involves responding to cues from the collaborative CALL environment. What marks the beginning of the construction of language use affordances is the learners' realisation of the relevance signalled between a cue from the collaborative CALL environment and what the learners are seeking to find. The outcome of the language use affordances is the micro level of language emergence, the emergence of novel language use instances.

The findings in this study not only align with NH but also add to what is already known about it, especially with regard to the three attentional mechanisms, alertness, orientation, and detection (Tomlin & Villa, 1994). Orientation is the committing of attentional resources to sensory stimuli (ibid.), and the current study has found that learners commit attentional resources to cues in the environment when they are actively engaged in and with the collaborative CALL environment. Alertness has been described as the learners' state of readiness to detect the sought information (Schmidt, 2001). The current study provides evidence that the learners' capacity of such readiness is promoted by the learners' engagement in the collaborative CALL environment. According to Schmidt (2001), the attentional function of detection relates to both the conscious and unconscious levels of attention. The current study has shown that 'unconscious detection' is the learner's perception of the link between a cue in the collaborative CALL environment and what they seek to find - i.e. the process of signalling relevance. That perceived link becomes conscious when it is followed by an action, by which it is evaluated.

The study also reflects on the main terms of CT. As illustrated by Diagram 6.2, the process of language development, at its micro level, in collaborative CALL depends on how the learners interact and engage with the components of the collaborative CALL environment. This interaction is goal-directed and context-based; such an interaction depends on how the learners relate to the other components. These components are freely available cues that provide the collaborative CALL environment with a flow of 'energy'.

Since the whole process is triggered by this interaction, it represents the initial-state in this process, which is essential in determining the linguistic outcome (as in Larsen-Freeman & Cameron, 2008).

Through the evidence concerning how the construct of signalling relevance, which is what triggers the construction of language use affordances, is different from one learner to another, the study has provided another way than that is in the scholarly literature to explain the concepts of variability, adaptability and dynamicity of language development. As part of the process of the construction of affordances, learners evaluate the relevance of the attended-to-cues, which makes that process feedback-sensitive, i.e., adaptive. The process demonstrated in Diagram 6.2 is dynamic as it is not finalised. It is still part of the micro level of language development. The outcome of this process is the emergence of a language use instance, which by iteration becomes entrenched as a linguistic pattern and gives rise to the global order of the learners' language system (as in Ellis, 2008a; Larsen-Freeman & Cameron, 2008).

6.4. Implications for policy and pedagogical practice

This study has shown a range of characteristics of the collaborative CALL environment through which the CALL environment has a potential to foster language emergence. These characteristics include having a freely available and accessible source of cues, being engaging, multimodal, flexible, iterative and strategic, embodying the learning experience, and having a capacity to respond to the learners' individual differences.

The results in this study have shown that a freely available and accessible source of cues such as the Web promotes self-regulated learning as it offers learners multiple sources from which they can find and select the information they need. With multiple sources of cues, collaborative CALL activities provide learners with opportunities in which they can flexibly choose to work

and engage with modes that they prefer, i.e., to choose their own 'reading path'. In other words, a collaborative CALL environment with multiple sources of cues that are freely available and accessible has the potential to promote autonomy. This conclusion that links the use of multiple sources of cues in collaborative CALL environments with autonomy provides more detail about the specific process than that which has been found in previous studies that investigated autonomy in web-based learning environments in which autonomy was linked with collaboration (Kessler & Bikowski, 2010), opportunities to self-regulate (Beatty & Nunan, 2004) and opportunities to choose one of several topics (Chang, 2005). The current study has found that what promoted autonomy in collaborative CALL environments was the ways in which the learners engaged with the freely available and accessible sources of cues that were made available to them through the Web within the collaborative CALL environment.

However, as discussed in Chapter Five, there is a risk that learners could choose to over-rely on one mode in multimodal collaborative CALL activities. This is a risk because within multimodality research, it is argued that the meaning of the whole arises out of the contribution of each mode, as discussed earlier in 2.2.5. Furthermore, the interaction in the collaborative CALL activities can involve iterative language use. For example, the language use instances in which the learners used 'prefer', 'establish' and 'develop' were opportunities of iterative language use as they were opportunities in which the learners responded extemporaneously, being under communicative pressure, by using language they used before but within different situations. Also, these instances of language use were iterative because they were adaptive, and as argued, adaptive language usage leads to language development over time (Ellis, 2008a).

There are several ways in which these characteristics of the collaborative CALL environments might be used to help inform the practices involved in language education. Within a language learning environment, these characteristics could be realised if a range of techniques are employed by

the language teacher and/or the collaborative CALL course designer. The following table presents recommended ways in which each of these characteristics could be realised and improved.

Collaborative CALL environment	
Characteristic	**Implication**
Freely available information	• Using webpages that have embedded layers of other webpages • Providing opportunities for collaboration and interaction via different channels.
Engaging	• Guiding the learners' perception of the goals of the activity • Activating/building the learners background knowledge of the topic and of the technology used • Knowing and utilising the learners' interests, personal views and preferences about the topic.
Multimodal	• Incorporating multimodal materials in the design of the collaborative CALL activity • Encouraging multimodal presentation of the outcomes (e.g., oral presentation that involves use of visuals).
Embodied	• Involving face-to-face interaction as well as Web-based.
Flexible	• Flexible role allocation • Allowing variations in how the collaborative CALL is performed.
Strategic	• Developing a range of learning strategies that the learners need to search for information, select answers, assist each other and finish the activity.
Iterative	• Facilitating micro and macro language emergence by affording opportunities for use of the target language, iteratively not repetitively.

Individualistic	• Attending to the individual learners' needs, preferences and learning styles • Providing room for variations in activity outcomes • Considering individual development in assessment of the overall learning.

***Table 6.2**_Characterisitcs of collaborative CALL environments for pedagogical implications*

This research raises important considerations for policy-makers in the Omani context concerning the use of technology in the language classroom. As noted in Chapter One, the focus and scope of this study, investigating the bottom-up process of authentic language emergence within CALL environments, is unprecedented in the Omani context where there has been a consistent emphasis by the policy making bodies on the need to incorporate wider use of technology in the Omani higher education institutions - e.g., Education Council Oman (2016) and OAAA (2016). Therefore, the empirical evidence provided in this study about the bottom-up process of the emergence of authentic language use in the collaborative CALL environment could contribute to forming a basis for decisions relating to the incorporation of technology in the English language programmes in the Omani higher education institutions. For instance, the evidence provided in this study concerning the role of the constructs of *engaging* with computer-based cues and *signalling relevance* in the process of language emergence underscores the value of a learning-centred approach (as in Carnell, MacDonald & Askew, 2006; Hubball & Burt, 2004) in CALL environments in which the aim is to focus on the exploratory, collaborative, self-regulated process of language learning rather than the final product, as stated in Education Council Oman (2016) and OAAA (2016). These two constructs also provide insights into some considerations when assessing and evaluating language learning in CALL environments in the Omani context; considerations of the non-observable elements of the language use process, for instance.

The findings have implications for the direction of research in Oman which currently focuses on technology per se, for example by focusing on challenges to implementing technology in educational programmes (Al-senaidi et al, 2009; Terry, 2016), the effects of the use of technology on performance (Alkharusi et al, 2009), attitudes towards and perceptions about the use of technology in language learning (Ambu-Said, 2010) and on the effects of technology-mediated flipped instruction (Gasmi & Thomas, 2017). Thus, future research could explore further the constructs of *engaging* and *signalling relevance*, for instance, and investigate their role in language use within CALL environments from other educational sectors in Oman. Other areas for future research are suggested in the following section.

6.5. Limitations and future research

Since the focus of this study was primarily to investigate emergence of language use in the collaborative CALL environment, the study was limited to the contextual factors of the classroom. The influence of the broader context of those classes (the institution) were not drawn upon in the analysis. Research has suggested that the implementation of technology-based instruction is influenced by the institutional and cultural factors of the context (Terry, 2016; Thomas, 2017). Another area of limitation concerns the amount of data. As a qualitative study, the data generated could have been richer if more data sources had been used, such as the teachers. Also, interviewing only two groups from each collaborative CALL class, which had four to five groups in total, limited the range and variety of the data obtained from those collaborative CALL classes. Additionally, as a study that explored the emergence of the learners' language use while involved in a collaborative language learning activity, the extent of that exploration was constrained by the use of a single type of stimulus, video recordings.

The identified limitations of this study could be addressed in future research in multiple ways. For future research, other studies would benefit from a partial or extended replication study in similar as well as different contexts.

Through a partial replication, a follow-up research could examine the role of engagement or attention in language emergence within collaborative CALL by recording patterns of the ways in which the learners engage with the collaborative CALL components and the particular relevance that is signaled. Also, the understanding of the role of attention in language emergence that has been developed in this study could be enhanced by an extended replication study in which think–aloud protocol is used to explore further the real-time attentional mechanisms involved in collaborative CALL. It is, however, recognised that within the theoretical framework of CT, attempts of intervention or control over any aspect in the experimental intervention make the circumstances of the study artificial and ecologically suspect (Larsen-Freeman, 2016a). Yet, partial or extended replication has been presented and used in the literature as a way to (a) clarify some of the conflicting areas such as feedback and the use of multimodality in this study, (b) provide greater clarity on the role of attention in language emergence, and (c) extend the results to a wider range of target structures and age groups (Gass & Valmori, 2015).

Similarly, a longitudinal or ethnographic study of collaborative CALL where a fine grained- and thick-description of language development could be captured might add a lot to the richness and rigour of the study. It would also allow observation of the long-term macro emergence of linguistic patterns and add to the micro processes of language emergence found in this study. To evaluate and build on the findings of this study, the findings could be framed within other ecological approaches. For instance, being a theory that aligns with CT in that it emphasises the integral role of the computer used in a learning activity, the goal-directedness of the learners' actions, and the interconnectedness of the internal and external resources of the learners within the learning environment, Activity Theory could form an alternative theoretical basis for a follow-up study that could provide a different insight into the processes of language development in collaborative CALL or test the rigour of the theoretical model that resulted from the analysis of the findings in the study, as presented in Diagram 6.2.

Moreover, based on the findings and analysis of this study, the use of eye-tracking technology could enrich the data by providing quantitative evidence, particularly with regard to noticing and multimodality. Since this study has identified that perception of keywords could play a facilitative as well as hindering role in the meaning making process, the use of eye-tracking technology could help to measure when, how long and how often learners fixated their visual attention on keywords; hence adding quantitative data. Fixation has been described in eye-tracking research as the ability to position the target object (e.g., keywords) into the fovea in the eye to maximise the focus given to the object producing data that could be represented visually in videos and images (Stickler & Shi, 2017). Future research could also incorporate the use of learning analytics (e.g., data from dashboards of learning platforms) to track learners' activities while performing online as part of the collaborative CALL activity. Incorporating data from learning analytics could enable researchers to manage big data and to be able to address learning issues such as motivation, engagement, pedagogical processes, the activity design and instructor-led interventions (Thomas, Reinders & Gelan, 2017).

6.6. Research summary

This study has resulted in the development of a theoretical model, as illustrated through Diagram 6.2 above, that can be useful as a way to understand the processes through which learners relate to components in a collaborative computer-based language learning environment and how such ways relate to language emergence. This theoretical model comprises the combined perspectives of CT, NH and affordances. Within the process of language emergence illustrated by this model, the learners in this study were involved in embedded processes of: (a) engagement with the cues from the collaborative CALL environment, (b) processes of affordances construction that involved ways of perception and signalling relevance, (c) and making decisions about language use. It is suggested in this study that the occurrence of these processes can be enhanced by facilitating and promoting characteristics of the collaborative CALL environment which

include improving the ways in which learners engage with Web-based material, collaborate with each other, and have the opportunity to involve in a variety of iterative and individualistic language use opportunities.

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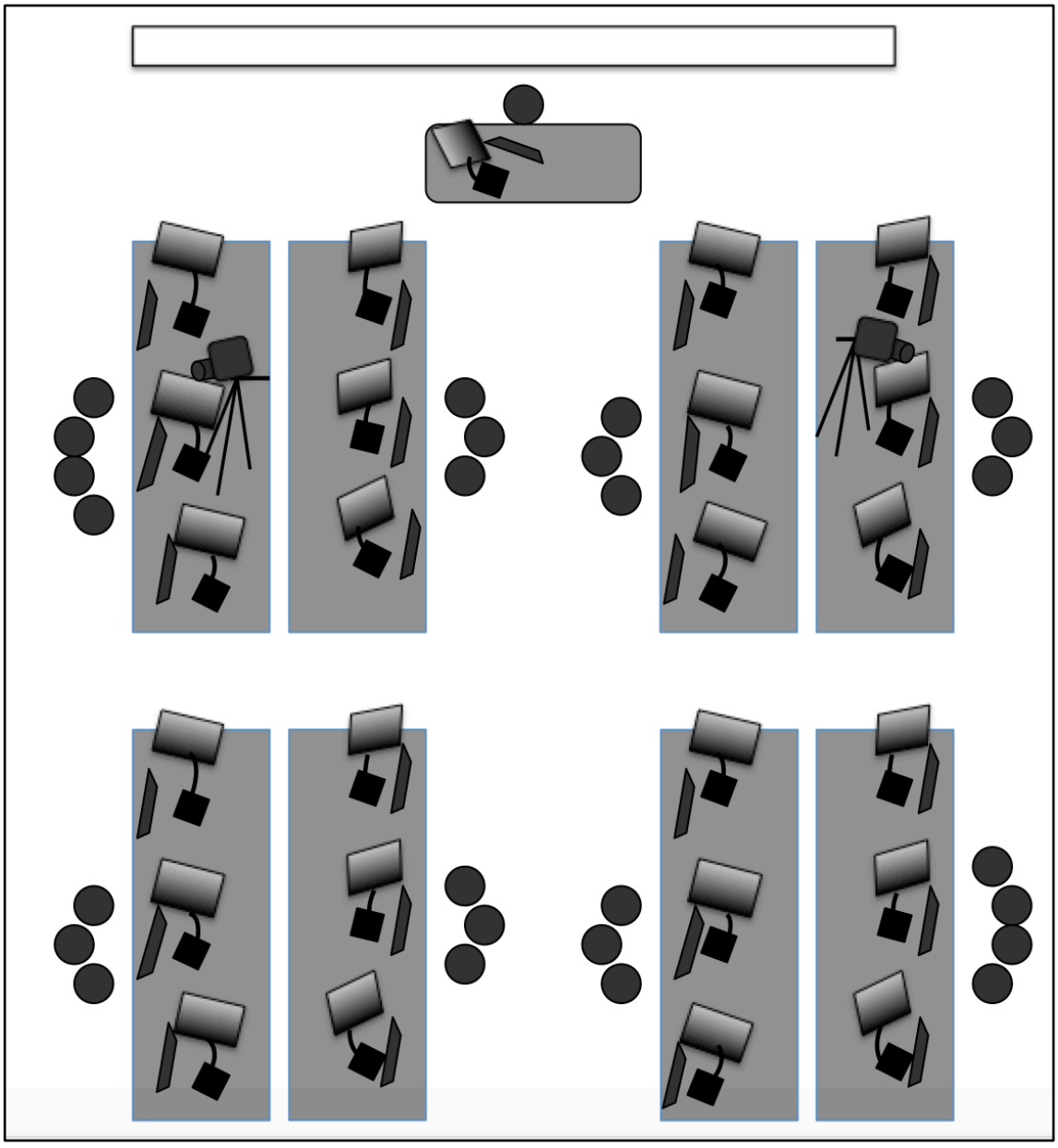
Appendices

Appendix 1: Collaborative CALL class_ Seating Plan



Appendix 2: Samples from data transcripts

Class_1_Group_2 – VSRI transcript

TIME: 00:27

R: This was in the very beginning of the activity. You were pointing at something on the screen. Can you remember what you wanted to say?

B: I think we were trying to find a good website where we can find as much information as possible.

A: Yes and we started to look for the people we could talk about, explorers.

B: Yes Explorers.

A: So we found a website.

B: I think it was IMB in capital letters.

A: So we saw Galileo on that website; she (B) saw it.

B: Yes it was Galileo.

R: So, what did you do exactly to find and choose Galileo?

B: The first thing we wrote was famous scientist. Famous scientist yeah?

A: Yes famous scientist.

B: Yes so we got the options [Links] and we chose Galileo. It was only famous scientists; then we got on a website where there were more than one scientist. On that page, the first name was Galileo.

R: Why? What did you think about when you saw the name, Galileo?

B: Because the name was not new. We thought it was interesting and also it was not one of the names that the teacher told us not to choose.

A: He specified some names that we should not choose because they were well known.

Class_1_Group_1 – VSRI transcript

Time: 00.29

R. Here you started saying 'scientist, scientist' and you were typing something. What was in your mind? What did you want to say?

B: I think it was what doing, what doing [In English]. It was talking about something that the person did, the scientist.

R: Yes, but what was in your mind when you were saying scientist and at the same time typing it on the screen.

C: scientists (In Arabic).

B: I wanted to find something and the information about it.

A: There were a group of images we could choose from and we discuss about.

B: Yes so it becomes easier.

R: And when you were looking at the images, what was in your mind?

A: We thought that the scientist we have to choose is different. I mean he/she invented something

C: We thought of a scientist, a new scientist we did not know about; so we put scientist so that we know a bigger group of scientists.

R: Ok, so the minute you saw the screen, after typing scientists, what came into your mind?

A: The minute we saw Marie Curie; we remembered what she invented/explored and how she died and the impact of her exploration on the world.

Class 2_Group 2_VSRI transcript

TIME: 07:38

R: This was right in the beginning of the activity. You [B] you were pointing at something on the screen and asking (A) about it? What was in your mind?

B: I was asking him about something like a clock that was on the blog page. It was counting down.

A: I thought it was indicating the end of the lecture.

B: I also thought that it would be counting down for a programme or something.

C: Yes it looked like a clock.

TIME: 08:15

R: The same here, you [B] are pointing at something to your friend [A]. What did you want to say?

A: I think it was about the comment box. There was a place for the name also. It had the name and URL.

B: Yes yes. I did not pay attention to the teacher when he explained that bit. He explained how to add a comment but I was busy writing my comment on my notebook. He [A] then explained it to me.

R: What about you [C]?

C: I was working on my own here.

R: What exactly you [B] were asking about?

B: About the name and URL. I did not know what URL was.

C: You don't write anything there except your name, so that they know who wrote that comment.

B: I was very active during this activity [laugh]! I think 90% will be about me!

R: We will see!

TIME: 12:00

R: Here while the teacher was talking about the images on his blog, you [A] were pointing at something on the screen. What was in your mind?

A: I was pointing at the same images. I saw them [B and C] talking, so I showed them the images the teacher was talking about because I knew they missed it.

B: Yes we were talking about something else, and he helped us.

R: Alright, so when you saw the images on the blog, what came into your mind?

A: I thought it was something else. I thought they were like those ads we find sometimes when we open a webpage. I immediately thought they were not related to the lesson. I was telling myself those ads are following us even here! Then I heard the teacher talking about them.

R: What about you [B and C], do you want to say something else?

C: Because I was paying attention to the teacher, I knew that those images were about ads which was the topic of that lesson.

B: Yes they were clear.

TIME: 12:55

R: Here you were looking at the screen and then you got into an interaction referring to the screen from time to time. What was going on?

A: The teacher was explaining where to find the box to add a comment. He [C] did not know how to find that box.

C: Yes, I did not know where the comments were. I was looking at the page but couldn't find it.

A: There was a button below the page. We had to press that to see the comments.

B: Yes it wasn't clear. I also couldn't find it. Only when A did it in front of me, I knew what I had to do.

C: I also didn't know what to do and he [A] showed me.

R: So when you [B] saw A working on it, what was in your mind?

B: I knew that A knows how to do it. I heard him say … [comment]. When he pressed on that button I did the same.

R: How did you know that what you were doing was correct?

B: I just knew it was. Anything A does is always correct [laugh].

A: No it was just because I was paying attention. When he was explaining, I was following him on the screen. I myself did not find it [comment button]. I was looking for it all over the page and then found it in the bottom of the page.

B: I also knew it was correct because right after he clicked on that button I did the same and we found the teacher's comment.

Class 3_Group 1 VSRI transcript

TIME: 17:30

R: This was after you talked about the photos on the board. You [A] seemed to be looking for something. You look at your screen then at your friends', what was in your mind?

B: I think we were trying to decide on a place.

A: Yes we were looking for a destination.

R: What was in your mind when you turned towards your friends?

A: I wanted to say Dubai but then I heard a group talking about Dubai so we changed and chose Paris.

TIME: 18:00

R: Here you [A] were looking at the screen using the mouse, and you (C) were pointing at something. What was going on?

A: Here we had a Google page open, but we did not know from where to start. Do we start with the flight details or the hotel? Then the teacher said that we had to start with the flight details.

R: What about you [C] what were you trying to say?

C: I was telling him that we should use that information.

R: What information.

A: The website [Google links].

R: Can you remember what it was?

A: No, It was the first link we got.

R: Why did you choose the first one?

A: Because on Google, the first link is the mostly used and visited.

B: Yes highly used.

R: So when you got the links, you immediately chose the first one.

A: Yes without even reading.

R: What came into your mind when you clicked on that link?

C: types.

A: We got the information we needed.

B: It was clear.

R: What did you type in the search bar?

B: We typed what we needed to find like 'flights to …'

A: I think it was 'flights online'.

C: 'book flights online'

TIME 18:40

R: Here you seem to discuss something on the screen and then you wrote something on your worksheet. What was going on?

B: The same. We were checking the website.

A: Yes we were trying to copy down the website for the flight booking.

TIME: 20:00

R: Here you decided to stop and asked the teacher. What was in your mind?

B: I wanted to ask her about the dates that we should choose. She said the first weekend of the month.

R: What were you working on on the screen?

B: The flight dates. We copied the dates ‘from’ and ‘to’. Then we chose the type of the flight, and before that we checked the price.

R: Can you remember what exactly you [B] and A were pointing at on the screen.

B: I think it was the flight details.

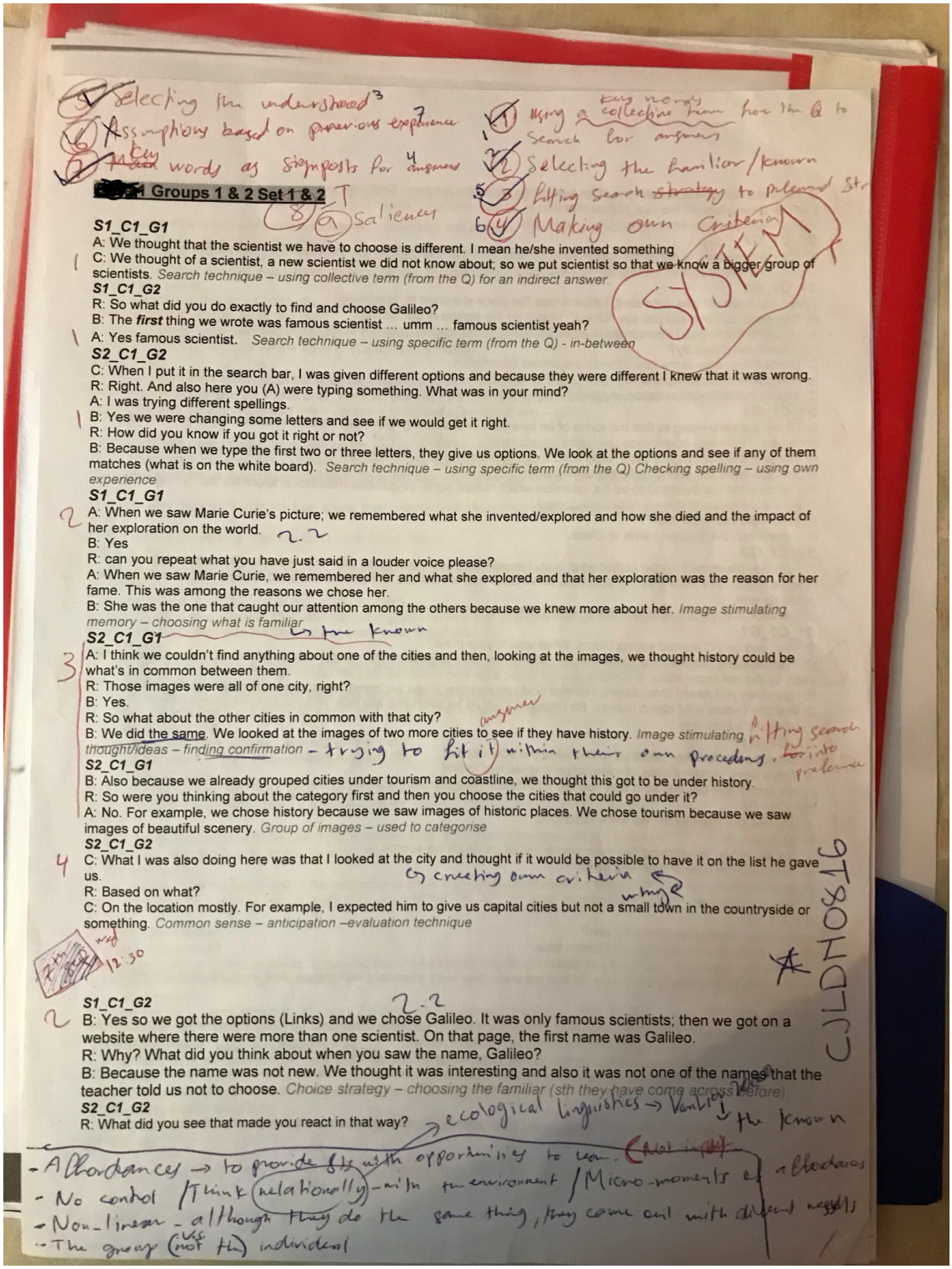
A: Yes it was the type of the flight, business or first class. Then we chose economy because it was the cheapest.

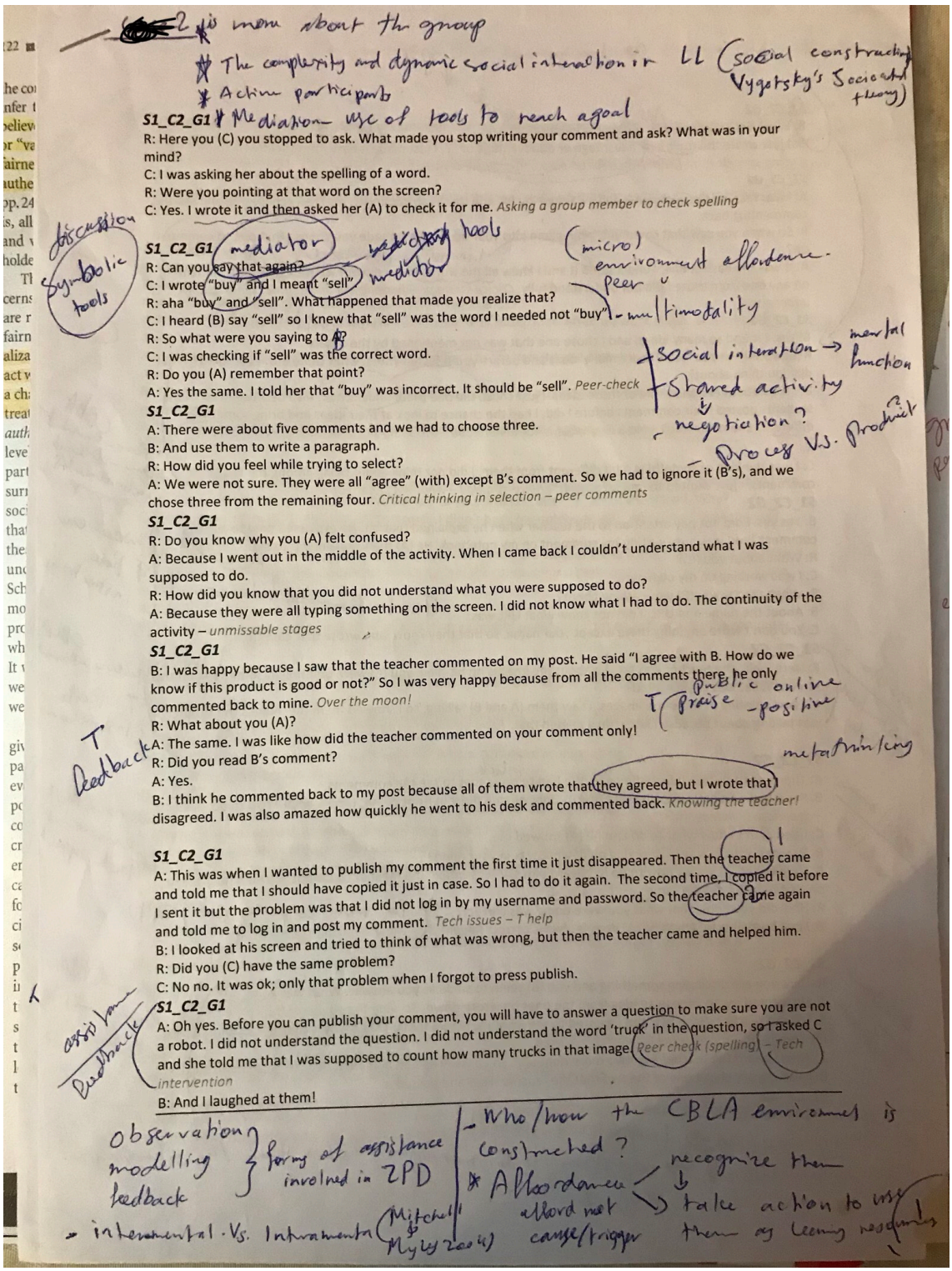
R: What about you [C], what where you thinking about here?

C: I was holding the mouse and moving it where they wanted.

B: He was in charge of the mouse.

Appendix 3: Sample of coding process





S1_C2_G1
R: Here you (C) you stopped to ask. What made you stop writing your comment and ask? What was in your mind?
C: I was asking her about the spelling of a word.
R: Were you pointing at that word on the screen?
C: Yes. I wrote it and then asked her (A) to check it for me. *Asking a group member to check spelling*

S1_C2_G1
R: Can you say that again?
C: I wrote "buy" and I meant "sell".
R: aha "buy" and "sell". What happened that made you realize that?
C: I heard (B) say "sell" so I knew that "sell" was the word I needed not "buy".
R: So what were you saying to B?
C: I was checking if "sell" was the correct word.
R: Do you (A) remember that point?
A: Yes the same. I told her that "buy" was incorrect. It should be "sell". *Peer-check*

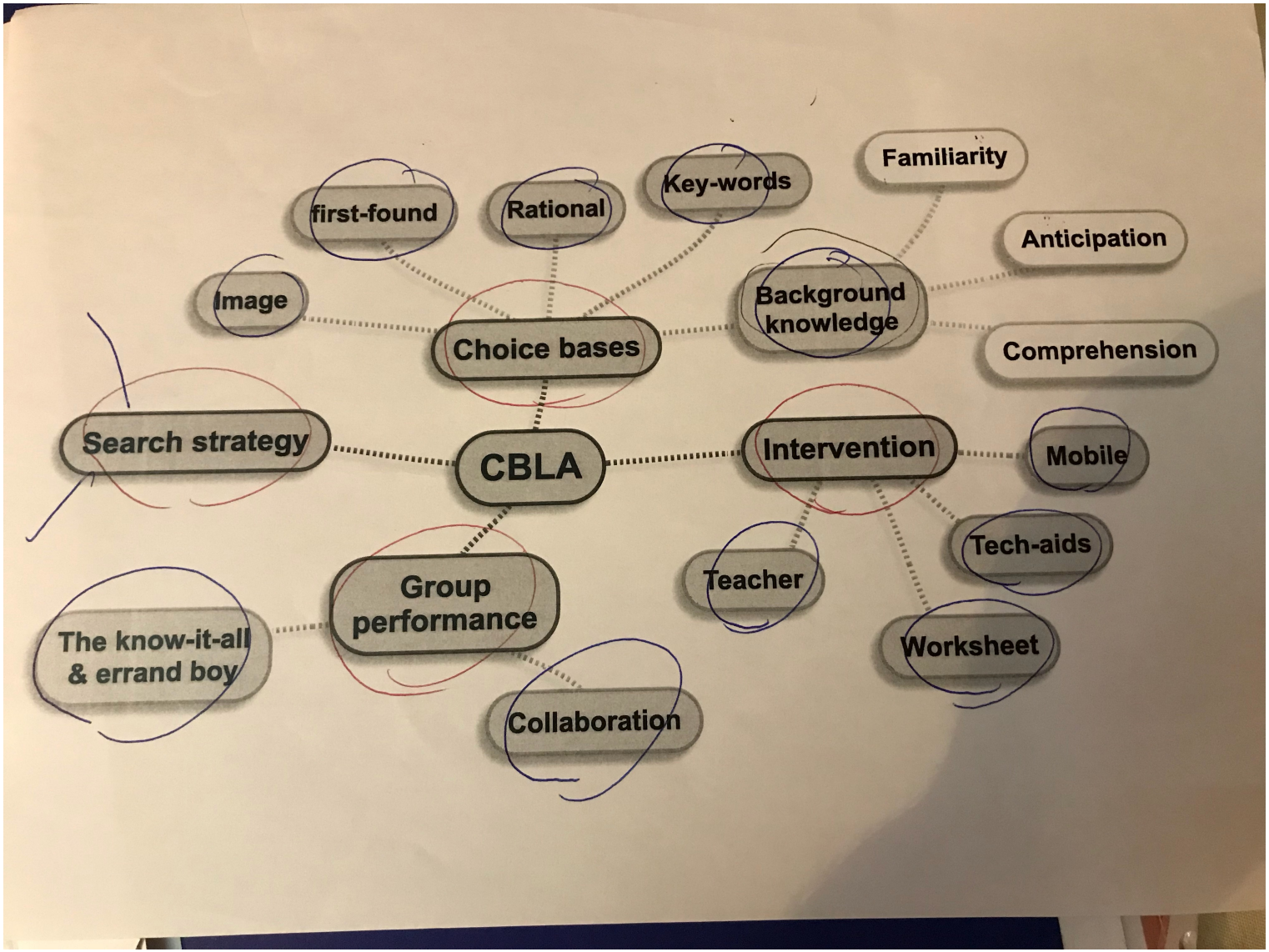
S1_C2_G1
A: There were about five comments and we had to choose three.
B: And use them to write a paragraph.
R: How did you feel while trying to select?
A: We were not sure. They were all "agree" (with) except B's comment. So we had to ignore it (B's), and we chose three from the remaining four. *Critical thinking in selection – peer comments*

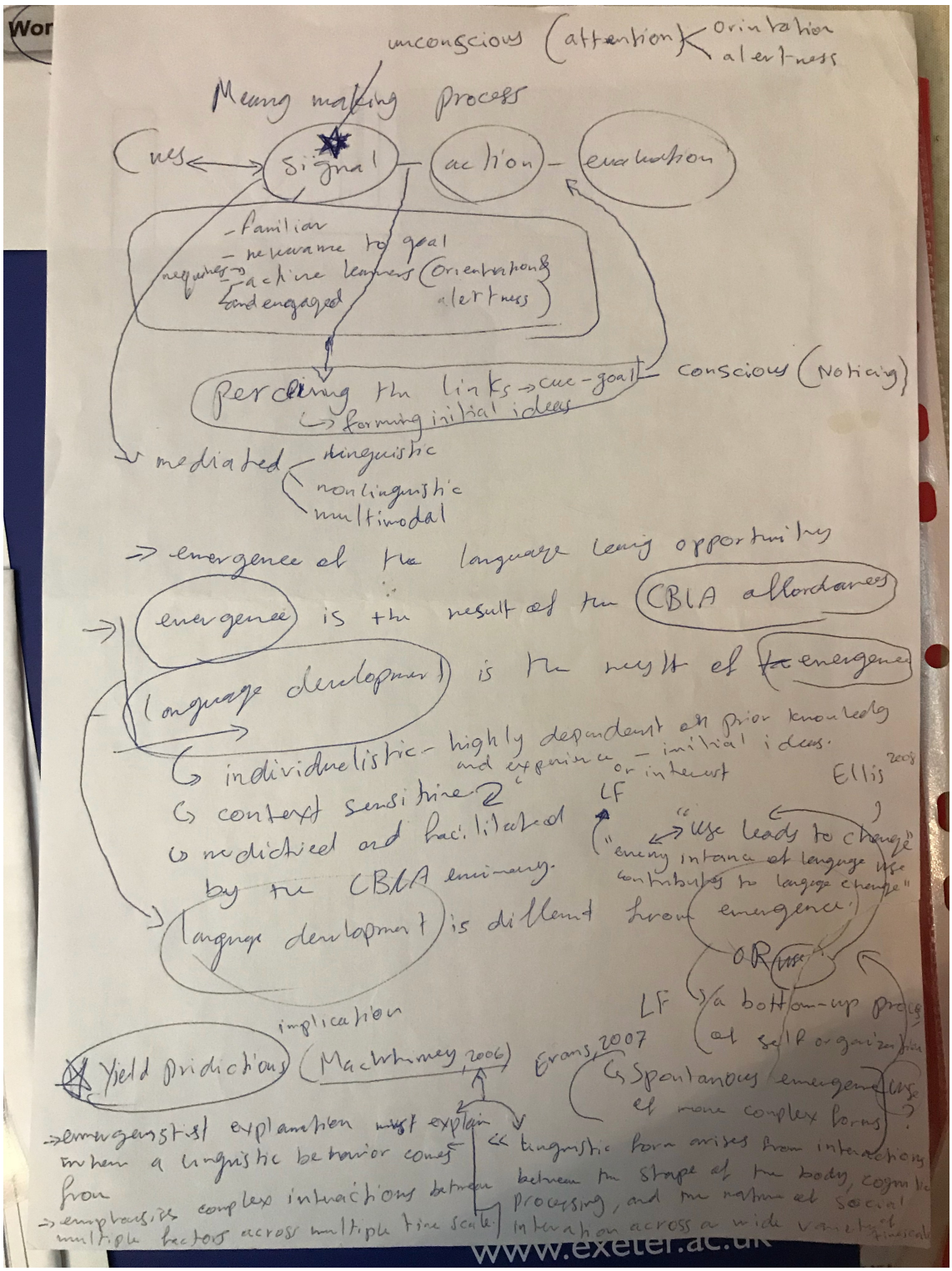
S1_C2_G1
R: Do you know why you (A) felt confused?
A: Because I went out in the middle of the activity. When I came back I couldn't understand what I was supposed to do.
R: How did you know that you did not understand what you were supposed to do?
A: Because they were all typing something on the screen. I did not know what I had to do. The continuity of the activity – *unmissable stages*

S1_C2_G1
B: I was happy because I saw that the teacher commented on my post. He said "I agree with B. How do we know if this product is good or not?" So I was very happy because from all the comments there, he only commented back to mine. *Over the moon!*
R: What about you (A)?
A: The same. I was like how did the teacher commented on your comment only!
R: Did you read B's comment?
A: Yes.
B: I think he commented back to my post because all of them wrote that they agreed, but I wrote that I disagreed. I was also amazed how quickly he went to his desk and commented back. *Knowing the teacher!*

S1_C2_G1
A: This was when I wanted to publish my comment the first time it just disappeared. Then the teacher came and told me that I should have copied it just in case. So I had to do it again. The second time, I copied it before I sent it but the problem was that I did not log in by my username and password. So the teacher came again and told me to log in and post my comment. *Tech issues – T help*
B: I looked at his screen and tried to think of what was wrong, but then the teacher came and helped him.
R: Did you (C) have the same problem?
C: No no. It was ok; only that problem when I forgot to press publish.

S1_C2_G1
A: Oh yes. Before you can publish your comment, you will have to answer a question to make sure you are not a robot. I did not understand the question. I did not understand the word 'truck' in the question, so I asked C and she told me that I was supposed to count how many trucks in that image. *Peer check (spelling) – Tech intervention*
B: And I laughed at them!


Familiarity
Key-words
first-found
Rational
Anticipation
Image
Background knowledge
Choice bases
Comprehension
Search strategy
CBLA
Intervention
Mobile
Tech-aids
Teacher
Group performance
The know-it-all & errand boy
Worksheet
Collaboration


unconscious (attention) orientation alertness
Meaning making process
cues
signal
action
evaluation
- familiar
- relevance to goal
requires → machine learners (orientation & alertness)
& engaged
Perceiving the links → cue-goal
→ forming initial ideas
conscious (Noticing)
mediated
linguistic
non-linguistic
multimodal
→ emergence of the language being opportunity
emergence is the result of the CBLA affordances
language development is the result of ~~to~~ emergence
individuelistic - highly dependent on prior knowledge and experience - initial ideas.
or interest
context sensitive
& predicted and facilitated by the CBLA emergy.
Ellis 2008
LF
"use leads to change"
"every instance of language use contributes to language change"
language development is distinct from emergence
OR
LF
a bottom-up proc
at self organizat
implication
Yield Predictions
(Machtmey 2006)
Evans 2007
Spontaneous emergence
of more complex forms
→ emergentist explanation must explain
when a linguistic behavior comes
from
→ emphasizes complex interactions between
multiple factors across multiple time scale
<< linguistic form arises from interactions
between the shape of the body, cognitive
processing, and the nature of social
interaction across a wide variety of
www.exeter.ac.uk

Appendix 4: Information sheet and informed consent (Teachers)

Faculty of Humanities and Social Sciences

Department of Education

PARTICIPANT INFORMATION SHEET

Invitation

You are invited to take part in a PhD research study conducted by FAISAL AL SAIDI from the Department of Education at the University of Bath, UK. The study investigates the extent of the relationship between computer-based collaborative language activities and noticing of new language.

This research study has been approved by the Department of Education's Research Ethics Committee. Your participation in this study is entirely voluntary. Please read the information below and ask questions about anything you do not understand, before deciding whether or not to participate.

Time commitment and what is involved in participating

1. Your class in the [foundation or post foundation] programme will be observed and video-recorded on two occasions, once near the beginning and once near the end of the semester. I will be observing the whole lesson but my focus is going to be on the collaborative computer-based language activity, which learners carry out in groups. In each class, I will focus on at least two groups, which will be chosen randomly with the help of the class teacher.
2. If any of your learners are part of one of the groups I have focused on, they will participate in a group interview session within 24 hours of your class, together with the other learners in your group. During the session, I will use episodes from the video recordings to stimulate responses to some questions about participation in the computer-based activity.

Benefits and risks

- By taking part in this study, you will be generously contributing to educational research in Oman. As it is a study that involves the use of technology in teaching English, it may help to enhance our English language programmes in higher education.
- A summary of the research findings will be made available to you on request, once the data have been analysed.
- There are no foreseen risks to participating in this research. Your participation will not impact on your relationship with your institution; and will not have an impact on any aspect your employment.

Participation and withdrawal

- Your participation in this study is entirely voluntary. If you choose to participate, you have the right to withdraw at any time without prejudice and without providing a reason. In the event that you decide to withdraw, discussions will be held with you on how, if at all, any existing data will be used.

Usage of the data and confidentiality

- **During research** - all information that is obtained in connection with this study and that can be identified with the participants will remain confidential and will be used only and exclusively for the purposes of this study.
- **Dissemination** – the data collected (including notes, videotapes and any digitally recorded activity) will not be released or circulated except between the researcher, his two supervisors and examiners, if required. In any publications resulting from this study, confidentiality will be safeguarded through the use of pseudonyms for individuals and the institution.
- **Storage, archiving, sharing and re-use of data** – all data will be coded using pseudonyms and kept in password-secured electronic devices (offline and online) that only the researcher and his two supervisors will be able to access.

Identification of the researcher:

Should you have any questions or concerns about this research, please contact:

Researcher: **Faisal Al Saidi**

Email: fsaa21@bath.ac.uk or [redacted]

Mobile: [redacted]

INFORMED CONSENT FORM

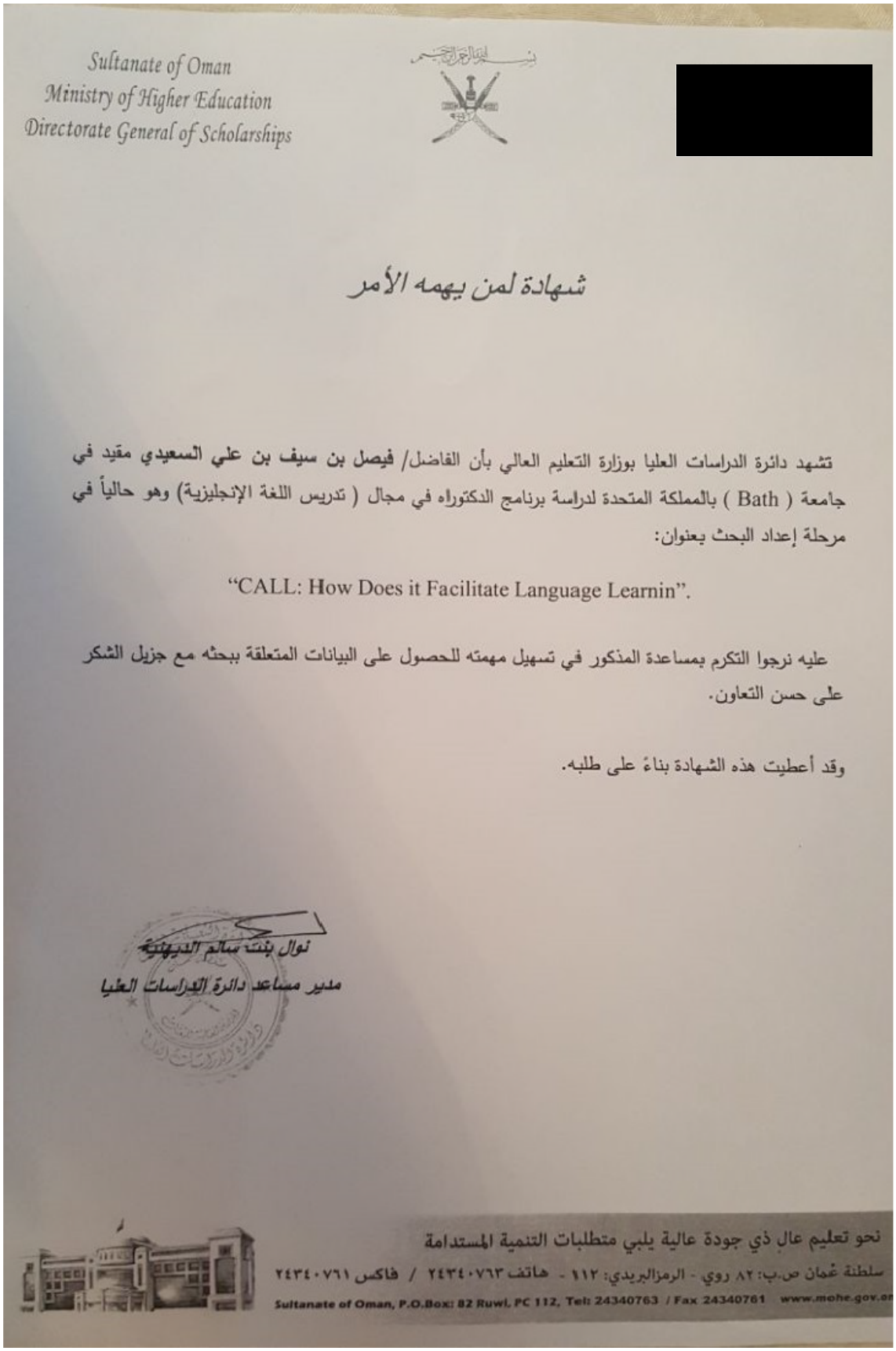
Title of the study: The Relationship Between Computer-Based Language Learning Activities, Collaboration and Noticing of New Language: A Sociocognitive Study of Adult Omani Students

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed.
- I understand that I can withdraw from the study any personal data (i.e. data which identify me personally) at any time.
- I understand that anonymised data (i.e. data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the project by granting access to my classes
- I consent to being audio and video recorded as part of the project if required.

(**Class teacher** PRINT NAME)	
Signature of Participant:	Date:

(RESEARCHER) *Faisal Al Saidi*	
Signature:	Date:

Appendix 5: Supporting Letter



Sultanate of Oman
Ministry of Higher Education
Directorate General of Scholarships

بسم الله الرحمن الرحيم

[redacted]

شهادة لمن يهمه الأمر

تشهد دائرة الدراسات العليا بوزارة التعليم العالي بأن الفاضل/ **فيصل بن سيف بن علي السعيدي** مقيد في جامعة (Bath) بالمملكة المتحدة لدراسة برنامج الدكتوراه في مجال (تدريس اللغة الإنجليزية) وهو حالياً في مرحلة إعداد البحث بعنوان:

"CALL: How Does it Facilitate Language Learnin".

عليه نرجوا التكرم بمساعدة المذكور في تسهيل مهمته للحصول على البيانات المتعلقة ببحثه مع جزيل الشكر على حسن التعاون.

وقد أعطيت هذه الشهادة بناءً على طلبه.

نوال بنت سالم الديهانية
مدير مساعد دائرة الدراسات العليا

نحو تعليم عالٍ ذي جودة عالية يلبي متطلبات التنمية المستدامة
سلطنة عُمان ص.ب: ٨٢ روي - الرمزالبريدي: ١١٢ - هاتف ٢٤٣٤٠٧٦٣ / فاكس ٢٤٣٤٠٧٦١
Sultanate of Oman, P.O.Box: 82 Ruwi, PC 112, Tel: 24340763 / Fax 24340761 www.mohe.gov.o

Appendix 6: Information sheet and informed consent (Learners)

Faculty of Humanities and Social Sciences

Department of Education

PARTICIPANT INFORMATION SHEET

Research title

The Relationship Between Computer-Based Language Learning Activities, Collaboration and Noticing of New Language: A Sociocognitive Study of Adult Omani Students

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Time commitment and what is involved in participating

Your participation will involve the following:

3. Your class in the [foundation or post foundation] programme will be observed and video-recorded on two occasions, once near the beginning and once near the end of the semester. I will be observing the whole lesson but my focus is going to be on the collaborative computer-based language activity, which learners carry out in groups. In each class, I will focus on at least two groups, which will be chosen randomly with the help of the class teacher.
4. If you are part of one of the groups I have focused on, you will participate in a group interview session within 24 hours of your class, together with the other learners in your group. During the session, I will use episodes from the video recordings to stimulate responses to some questions about participation in the computer-based activity.

Benefits and risks

- By taking part in this study, you will be generously contributing to educational research in Oman. As it is a study that involves the use of technology in teaching English, it may help to enhance our English language programmes in higher education.
- A summary of the research findings will be made available to you on request, once the data have been analysed.
- There are no foreseen risks to participating in this research. Your participation will not impact on your relationship with your teacher or [institution]; and will not have an impact on any aspect of study or your grades.

Participation and withdrawal

- Your participation in this study is entirely voluntary. If you choose to participate, you have the right to withdraw at any time without prejudice and without providing a

reason. In the event that you decide to withdraw, discussions will be held with you on how, if at all, any existing data will be used.

Usage of the data and confidentiality

- **During research** - all information that is obtained in connection with this study and that can be identified with the participants will remain confidential and will be used only and exclusively for the purposes of this study.
- **Dissemination** – the data collected (including notes, videotapes and any digitally recorded activity) will not be released or circulated except between the researcher, his two supervisors and examiners, if required. In any publications resulting from this study, confidentiality will be safeguarded through the use of pseudonyms for individuals and the institution.
- **Storage, archiving, sharing and re-use of data** –All data will be coded using pseudonyms and kept in password-secured electronic devices (offline and online) that only the researcher and his two supervisors will be able to access.

Identification of the researcher:

Should you have any questions or concerns about this research, please contact:

Researcher: **Faisal Al Saidi**

Email: fsaa21@bath.ac.uk or [redacted]

Mobile: [redacted]

INFORMED CONSENT FORM

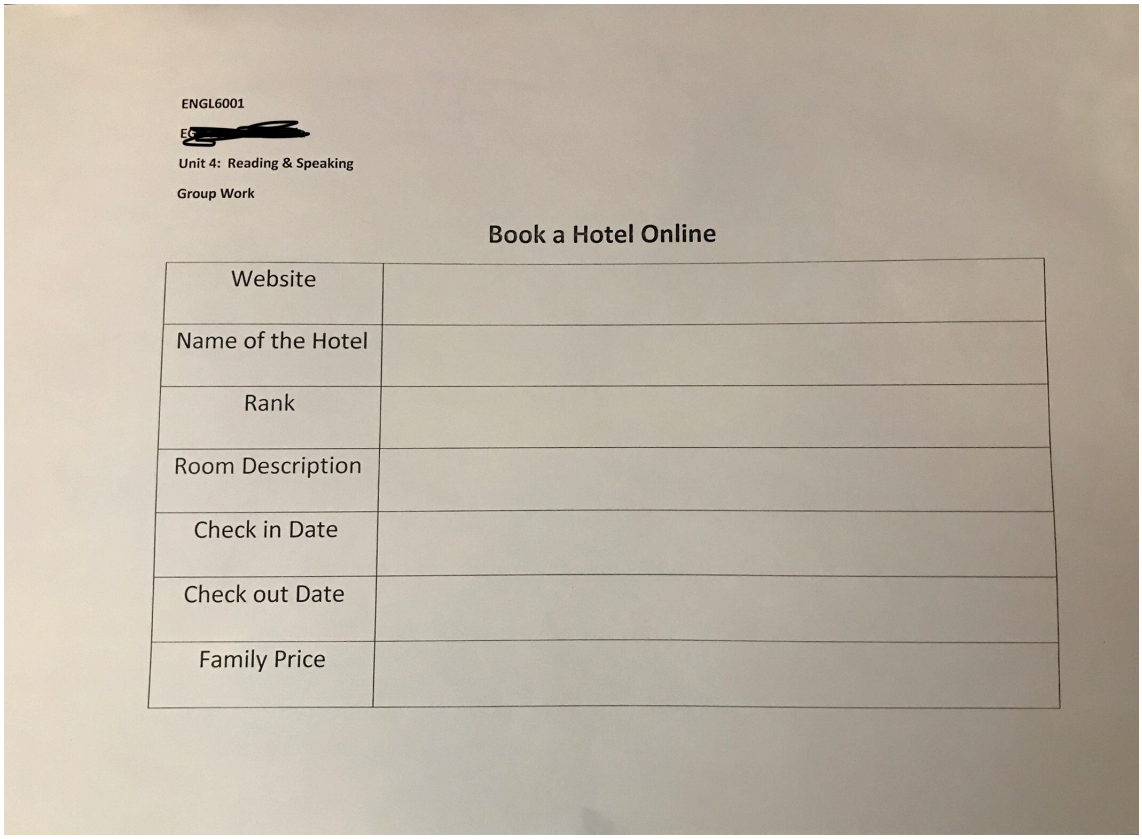
Title of the study: The Relationship Between Computer-Based Language Learning Activities, Collaboration and Noticing of New Language: A Sociocognitive Study of Adult Omani Students

- I confirm that I have read and understood the information sheet for the above project and the researcher has answered any queries to my satisfaction.
- I confirm that I was given an oral overview of this research in Arabic.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed.
- I understand that I can withdraw from the study any personal data (i.e. data which identify me personally) at any time.
- I understand that anonymised data (i.e. data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the project by being observed and interviewed.
- I consent to being audio and video recorded as part of the project if required.

(**Learner** PRINT NAME)	
Signature of Participant:	Date:

(RESEARCHER) *Faisal Al Saidi*	
Signature:	Date:

Appendix 7: Holiday-planning worksheet (Group 11)



ENGL6001

EG [redacted]

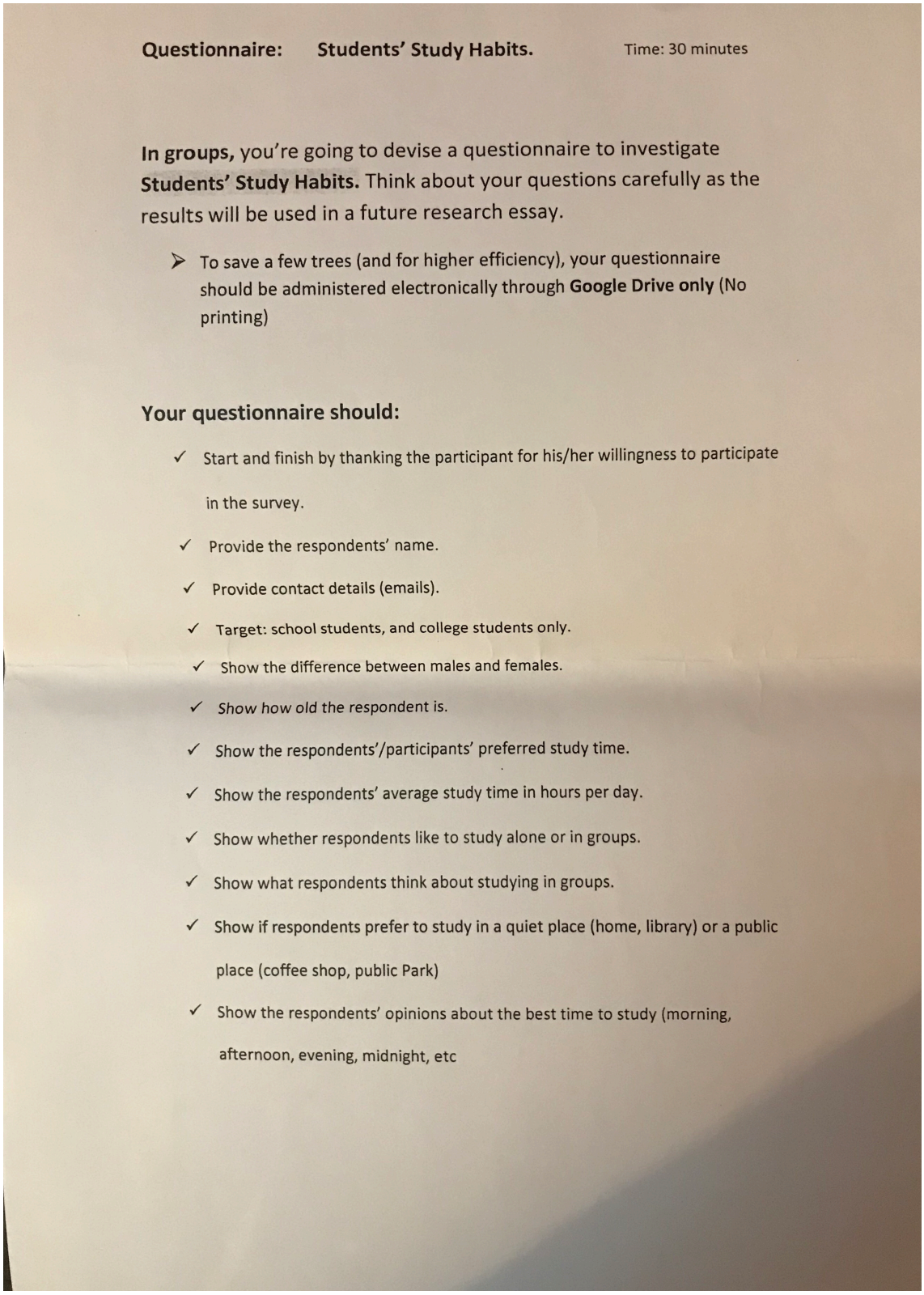
Unit 4: Reading & Speaking

Group Work

Book a Hotel Online

Website	
Name of the Hotel	
Rank	
Room Description	
Check in Date	
Check out Date	
Family Price	

Appendix 8: Online questionnaire writing (Group 10)



Questionnaire: Students' Study Habits. Time: 30 minutes

In groups, you're going to devise a questionnaire to investigate **Students' Study Habits.** Think about your questions carefully as the results will be used in a future research essay.

- To save a few trees (and for higher efficiency), your questionnaire should be administered electronically through **Google Drive only** (No printing)

Your questionnaire should:

- ✓ Start and finish by thanking the participant for his/her willingness to participate in the survey.
- ✓ Provide the respondents' name.
- ✓ Provide contact details (emails).
- ✓ Target: school students, and college students only.
- ✓ Show the difference between males and females.
- ✓ Show how old the respondent is.
- ✓ Show the respondents'/participants' preferred study time.
- ✓ Show the respondents' average study time in hours per day.
- ✓ Show whether respondents like to study alone or in groups.
- ✓ Show what respondents think about studying in groups.
- ✓ Show if respondents prefer to study in a quiet place (home, library) or a public place (coffee shop, public Park)
- ✓ Show the respondents' opinions about the best time to study (morning, afternoon, evening, midnight, etc

Appendix 9: Screenshot (Group 2)

Appendix 10: Screenshot (Group 11)